FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

No. 285. (No. 24, Vol. VI.)] JUNE 12, 1914. [Registered at the G.P.O. as a Newspaper.] [Weekly, Price 3d. Post Free, 3½d.

Flight.

Editorial Office: 44, ST. MARTIN'S LANE, LONDON, W.C.
Telegrams: Truditur, Westrand, London. Telephone: Gerrard 1828.
Annual Subscription Rates, Post Free.
United Kingdom ... 15s. 0d. Abroad ... ... 20s. 0d.

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EDITORIAL COMMENT.

The Future of Naval War.

Sir Percy Scott's theory that the day of the battleship has passed has created a great deal of discussion among naval authorities, and opinion seems to be rather divided upon the question of whether the future of naval war is with the Dreadnought or the submarine and aircraft. It is not for us to pass judgment in this controversy. The point, however, that does appeal is that aircraft, and particularly the aeroplane, should have thus early reached a stage of development which has caused so drastic a modification of the views of so high an authority as Admiral Scott. It is within our recollection that not so very long ago Sir Percy was the out-and-out advocate of the big gun in the big ship—indeed, he might almost have been described as the arch-priest of the Dreadnought. Now, at the time in question, the submarine had been developed within reasonable range of its present possibilities. True, it has been improved in the meantime, and that considerably, but the point is that it had come to a stage which was quite far enough advanced to have given pause to the apostles of the big ship if its destiny was, or is, to supplant the latter type. But, apparently, it had not dawned upon naval authorities that the time was close at hand when the sea-battles of the world would be fought out in the under-water depths rather than on the surface of the ocean. Thoughtful students of naval war had, indeed, turned their attention increasingly towards the submarine and its potentialities, but it was more as a fleet auxiliary, so to speak, than as a possible successor of the surface craft. That it could ever supplant the latter had not come within their prevision. Nor, so far as we as laymen are in a position to know, has so much progress been made in the development of the submarine or submersible as to justify that view, were it not that in the interval the aeroplane has been developed so rapidly that it has become a most important factor in warfare, land and marine.

The point that seems to emerge from Sir Percy Scott's argument seems to be this: Against the submarine alone, the battleship—or perhaps, it would be more correct to include all floating warships—by reason of its speed and sea-keeping qualities would have more than a fighting chance, since the submarine has to act under conditions which put a very distinct handicap on its chances of waging successful war. It has a very limited range of vision; its speed, both on the surface and when submerged, is far inferior to that of the above-water craft, and it is dependent for its offensive power upon a weapon—the torpedo—which has never proved itself to be dependable in action. It is true that the latest types of these craft are equipped with guns, but they are of such small calibre as to be quite ineffective against modern armoured ships. The most they could be expected to do would be in the way of repelling an attack by hostile torpedo craft for long enough to enable the necessary preparations for submersion to be made. Reinforced, however, by aircraft, it would seem that the submarine is in a far better position than when acting by itself. Firstly, the aeroplane might be expected to act as the eyes of the submarine flotilla—to stand in the same relation as do cruisers and fast craft generally to the battle-squadron. The aeroplanes would be sent out, either from a land base or from their mother ships, to search the enemy's coasts and harbours or to locate and keep touch with a blockading squadron, while the submarines lay handy for action when the aeroplanes had done their first duty of finding the enemy. Whether the clash would come in the shape of a combined attack from under water and the air is a matter that only the future can solve, but it is quite imaginable that this is what would happen. Again, whether such a combined attack would succeed is also a question for the future

to decide, but there are at least inherent probabilities to be taken into account, and it is undoubtedly these which have set authorities like Sir Percy Scott thinking—and thinking very seriously.

Not the least interesting point that appeals to us, is that all these changes, and rumours of change, have come about as a direct result of the development of the internal combustion engine. It was the internal combustion engine which really made the submarine as it exists to-day possible. Without it, submarine craft would have been possible in a sense but they would have been slow, clumsy affairs, with so limited a range of action as not to have been worth while wasting money upon. They would have been next door to useless even for purposes of harbour defence. Therefore, it is not claiming too much to say that it is the internal combustion engine which has given us the modern submarine. Then, the reader of FLIGHT does not need reminding that without the internal combustion motor the aeroplane would be utterly impossible. So out of the invention of the oil motor has developed something which threatens to revolutionise the armaments of the whole civilised world. Indeed, a part of that revolution has, in fact, been already accomplished.

The Safety of Flight.

It has always been our policy to insist that flying is becoming—has become—almost as safe as motoring on land, given adequate skill of the pilot and safe construction and proper equipment of the machine. So far as concerns the skill of the individual, we are fairly satisfied that this is generally speaking of a very high order indeed, since the number of accidents which happen and which are attributable to the fault of the pilot are very few. In the matter of construction, too, there is nothing much of which to complain, so that we may pretty safely assume that (a) the skilled pilot, and (b) the new and tested machine makes a combination that is as safe as need be. But beyond that it is incontestable that far too many accidents, major and minor, have happened since the opening of the year, and that they show no signs of diminution. The question that must suggest itself to the observer is: Why is this? It is exceedingly difficult to find a satisfactory answer to this, for the reason that it is hard to get pilots and others to give their views. Where the man is flying "on his own," he obviously will not give himself away any further than is necessary and is thus not likely to talk. On the other hand, where he is an employee his bread-and-butter may depend upon his keeping his own counsel, and so it is vain to look to him for light on the subject.

Now, much of the future of the movement depends upon the absolute safety, humanly speaking, of flying, and it would thus seem quite clear that to fly a machine which is constructionally weak, or is ill-equipped, is really against the interests of these who are responsible for its use—apart from the more serious considerations of the risk to human life involved. We do know that machines are habitually flown which while they may not actually be suffering from constructional weakness are in none too good condition and are, moreover, quite deficient in the necessary instruments to make flight on them reasonably secure. It can scarcely be held that a machine which is without engine-revolution indicator, altimeter, or speed-recorder is properly equipped for safe flying, and yet there are many machines being flown every day which have none of these. It seems to us that those who own them, more than the pilots who risk their lives by flying them, are acting against their own interests by a policy of parsimony which invites accident.

The Question of Welding.

A report of the Advisory Committee for Aeronautics as to the cause of fracture of the rudder post of B.E. 204, upon which Capt. Allen and Mr. Burroughs were killed in March last, is now to hand, and is recorded elsewhere in this issue. The conclusion arrived at is "that some flaw existed before the machine left the ground," but no definite conclusion is arrived at as to its cause, although two alternatives are suggested. The first is that as the machine had been subjected to severe stresses during its life, it is possible that the action of these had been sufficient to set up a flaw in a portion of the tube which had been overheated by welding; and the second, that the rudder post had been slightly bent by accident or rough usage, and that a flaw had been started thus, or as the result of subsequent straightening. The latter is, however, discountenanced, and we are left with the former as the cause of the accident.

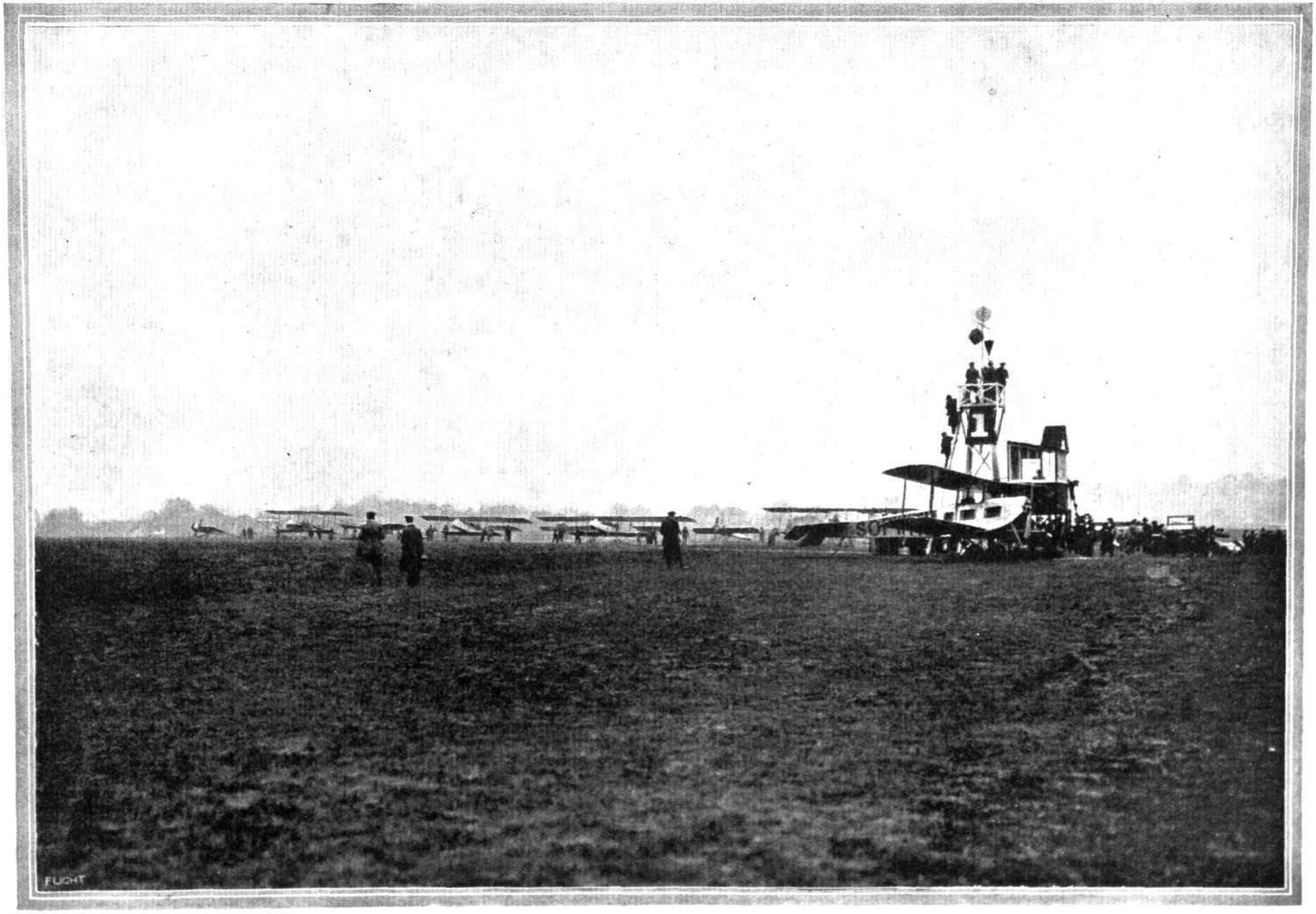
We might be prepared to accept this statement, bad as it is, without further comment were it not for two important points in the report (1) that "fracture took place across a section where the bending stresses were not far from a maximum *and where, owing to the fact that the steel had been raised to the temperature required for autogenous welding, and thus overheated, the tube was weakest*"; and (2) that the unwelded tube was found to be capable of bearing not less than three times the stress induced under the most severe conditions which, in the opinion of the Committee, would occur in flight. It is, to say the least, amazing that welding should have been permitted at this part without other means of support, in view of the known unreliability of welded joints under stress conditions and the effect of the operation on steel; and the fact is so well appreciated that its use is limited in other parts to merely "locating" their position. The statement that the factor of safety in an unwelded tube is three, is also far from satisfactory, even when it is remembered that the maximum possible loading in flight is referred to; because the tube which failed had been welded, and once a weld has been made, the strength of the part has become impaired. It would be more interesting and convincing to have seen figures quoted for the factor of safety in welded tube or tubes of similar dimensions; although, having regard to the possible variation in the resultant condition of the metal after treatment the matter might not carry us much further.

One fact stands out clearly—namely, that welding must be prohibited in any part of a machine where it will be subjected to stress under any conditions in flight. We are well aware that the method is employed in other machines, but wherever it is now adopted for the attachment of the principal parts of a machine it must be eliminated, or additional means of security provided without further delay.

Flying over Prohibited Areas.

M. SALMET appeared at the police-court at Torpoint, near Devonport, yesterday, on an adjourned summons issued by the Public Prosecuter alleging contravention of the Aerial Navigation Act of 1913, and a subsequent order of the Home Secretary by coming within the scheduled area at Penlee Point. He was bound over in £50 and ordered to pay the costs up to 10 guineas.

It is understood that another summons against Salmet for flying in the vicinity of the Admiralty oil tanks at Turnchapel, Plymouth, has been dropped by the Treasury.



THE AERIAL DERBY.—The lining up for the start at the Hendon Aerodrome.

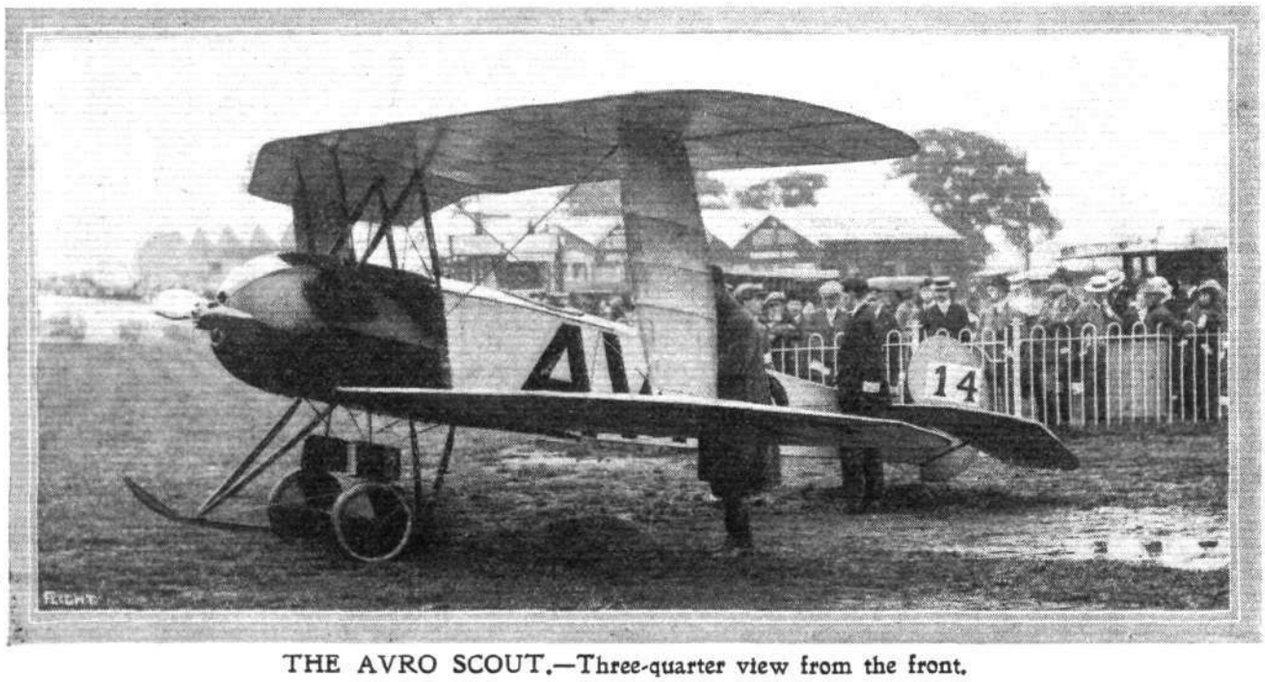
THE 80 H.P. AVRO SCOUT.

THE subject of our scale drawings this week—the 80 h.p. Avro Scout—made its first public appearance at Hendon on May 23rd last, piloted by Mr. F. P. Raynham. This machine had, we understand, only been tested on two short flights previously, so that, in view of the fact that she presents such considerable departures from standard design, her performances were very good indeed. From Mr. A. V. Roe we learn that the machine was not quite so fast as he had expected, but this was probably partly due to the fact that the engine was not running particularly well. As far as one was able to judge, the speed range was very considerable, and without knowing actual figures we should think that the maximum speed was over 90 m.p.h. The climbing capabilities also seemed very good indeed, Mr. Raynham taking the machine up at what looked like an alarmingly steep angle, but which was in reality probably about 30°.

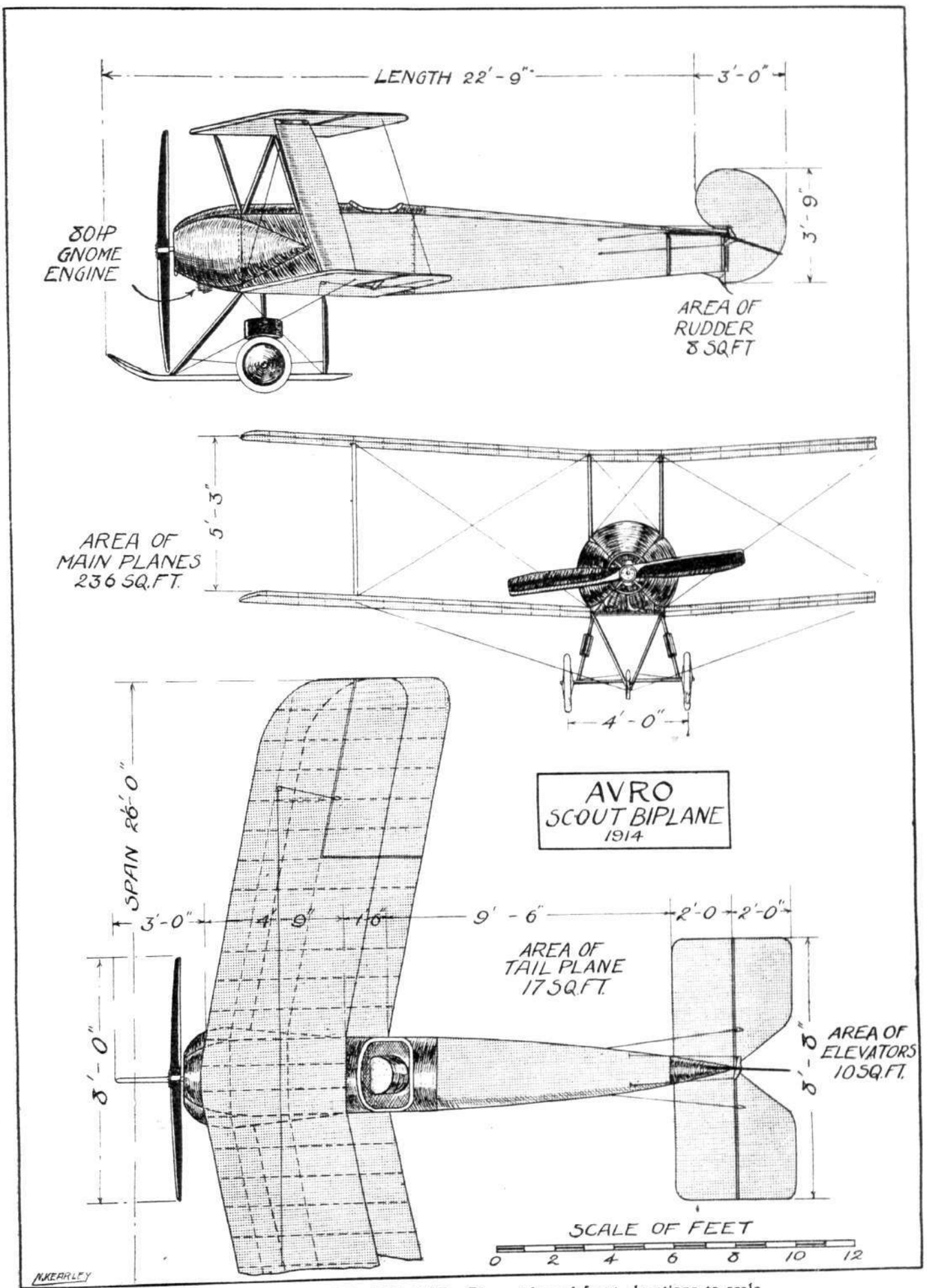
Constructionally, this machine differs little, at least as regards the *fuselage*, from standard Avro practice. It is mainly in the design and construction of the wings that innovations are to be found. Most noticeable among these is the way in which the main planes slope backwards so as to form a V as seen in plan. Only one pair of struts on each side separate the main planes, and these struts are cross-braced and covered in with fabric to form a unit, thereby reducing head resistance to that of a single strut. The wing bracing has been reduced to an absolute minimum since only one pair of cables on each side provide the necessary rigidity. At their outer ends these cables are attached, by means of a steel clip, to a steel tube of two inches diameter, built into the wing and joining the two spars. Thus, for any position of the centre of pressure the lift is always taken by both spars through the intermediary of the steel tube.

In section the wings are somewhat unusual in that they are perfectly flat on the under surface, whilst the top surface is cambered in the usual way. In addition to the backward slope of the wings, these are set at a very

THE AVRO SCOUT.—Side view.

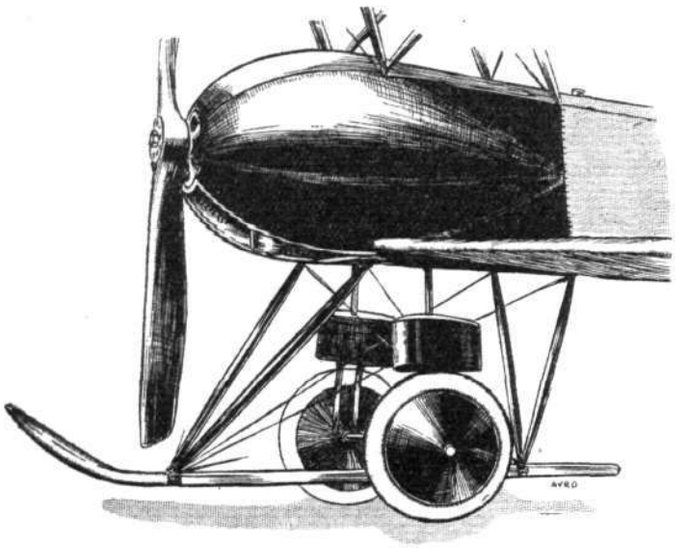


THE AVRO SCOUT.—Three-quarter view from the front.



THE AVRO SCOUT BIPLANE.—Plan, side and front elevations to scale.

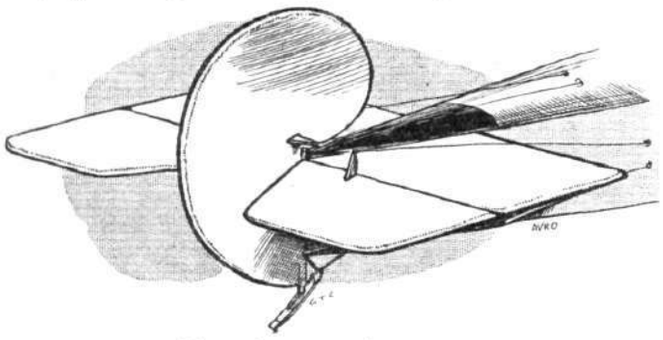
pronounced dihedral angle in order to increase lateral stability. *Ailerons* are fitted to both upper and lower planes, but the air brakes with which this machine was



Chassis and engine housing on Avro scout.

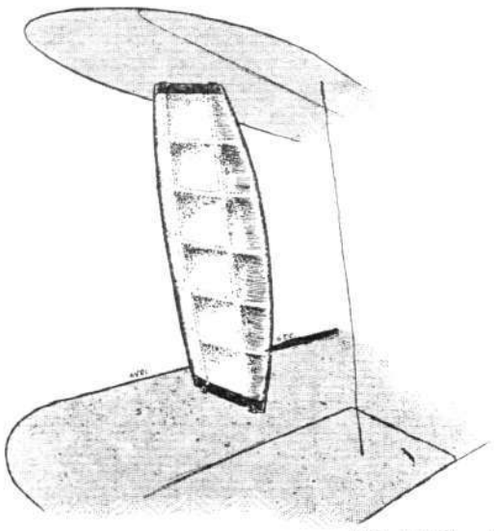
fitted at the Olympia Aero Show have been temporarily rendered immovable by securing them to the rear spar with an aluminium strip, probably owing to the fact that there has not yet been time for experiments with the action of these brakes.

The engine, an 80 h.p. Gnome, is mounted between double bearings, and is almost totally enclosed by an aluminium shield. Some trouble was experienced in keeping the engine cool so that it is possible that a few



Tail planes on Avro scout.

alterations will be effected in order to provide more efficient cooling. The chassis is of the usual Avro type, and appears to possess an enormous amount of flexibility. The *fuselage*, as has been already said, differs but little from those of the larger Avro biplanes. The four ash *longerons* are strengthened by triangular pieces of three-ply wood tacked on. The pilot is accommodated in a very comfortable bucket seat, and has in front of him a neat set of instruments mounted on an Avro instrument board. Control is by means of a single central column



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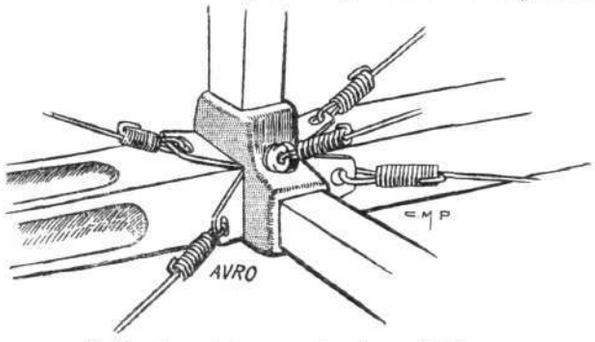
The streamline casing round the plane struts of the Avro scout.

mounted on a transverse rocking shaft, which carries crank-levers for the elevator. The rudder is operated by a pivoted foot-bar in the usual fashion. Mounted on the rear-end of the *fuselage* are the tail planes, which are of the usual Avro type, consisting of a fixed tail plane, to the trailing edge of which is hinged a divided elevator, and a balanced rudder. A small laminated steel skid protects the tail planes against contact with the ground.

It is difficult at the present juncture to express an



A *fuselage* joint on the Avro biplane.

opinion as to the merits or otherwise of this machine, but judging from her behaviour during her first flight in public, and considering the few tests that have been made with her up to now, she must be said to be very promising, and Messrs. A. V. Roe and Co. are to be heartily congratulated on their continued determination to introduce new departures in design.

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Military Aviation Fatalities.

IN the House of Commons on Tuesday, Mr. Tennant supplied Mr. Money with the following information as to the number of fatalities which have occurred amongst the military aviators of Britain, Germany, France, and Italy for each of the last two years :—

Aeroplane Accidents.

		1912.	1913.
Great Britain ...	Pilots	3	3
	Passengers ...	3	6
Germany ...	Pilots	8	12
	Passengers ...	3	4
France ...	Pilots	14	16
	Passengers ...	1	4
Italy	Pilots	4	2
Airship Accidents.			
Germany		–	45

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Aeroplanes for Red Cross Work, &c.

SOME novel flying should be seen at Brooklands on Saturday, June 20th, when a field day organised by the British Red Cross Society will take place. A rear guard action will be conducted on the aviation ground, the troops falling back on the portion of the River Wey near the fork. Gun-carrying and scout aeroplanes under the command of Capt. K. F. Wood will be employed, and after the action aeroplane search parties will assist in the work of the Red Cross Field Hospitals.

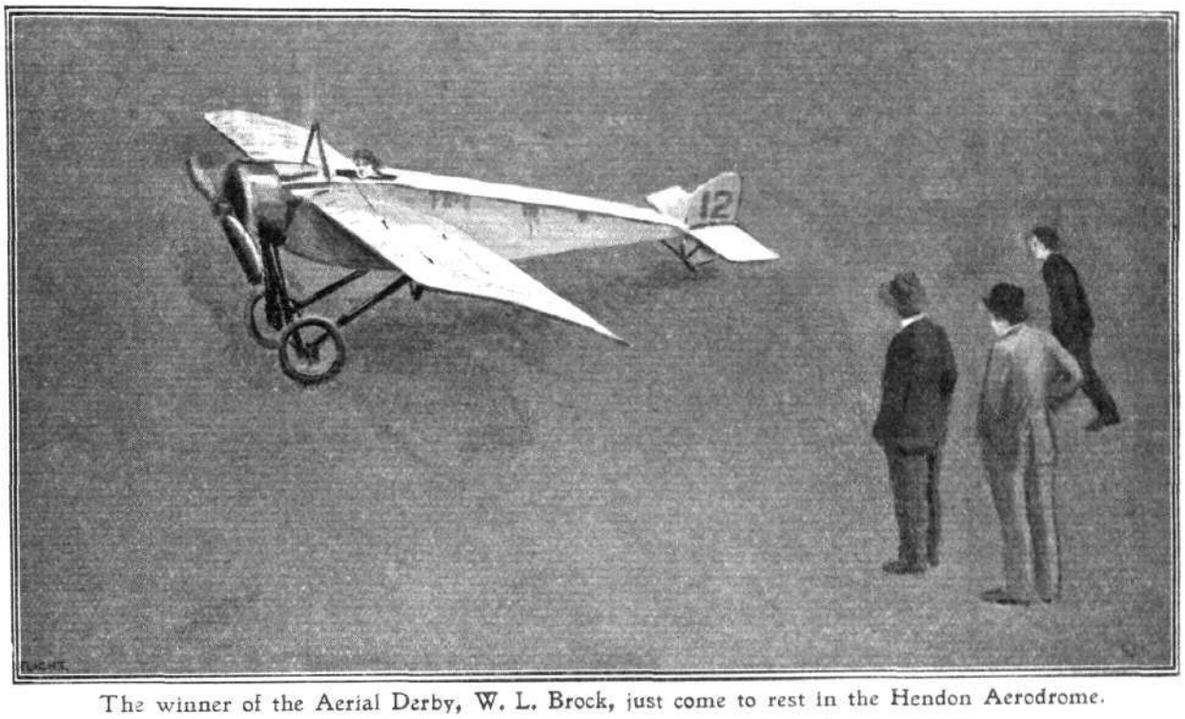
French Competition for Aeroplane Motors.

SOME little progress is being made in connection with the competition for aerial motors to be organised by the French War Department, and which has been on the *tapis* for several months. The trials will probably be held at the beginning of next year, and the Automobile Club of France will be asked to assist. There will be classes for small, medium, and large-powered engines.

FLIGHT

THE AERIAL DERBY, 1914.

IF the Third Aerial Derby was not a success from a spectacular point of view, it was a magnificent triumph for the modern pilot, who got the better of about the only thing left for a pilot to fear—fog and mist. As was to be expected of the English climate, last Saturday turned out to be far from favourable for such an occasion as the Aerial Derby. It was, in fact, almost as bad as the Saturday



The winner of the Aerial Derby, W. L. Brock, just come to rest in the Hendon Aerodrome.

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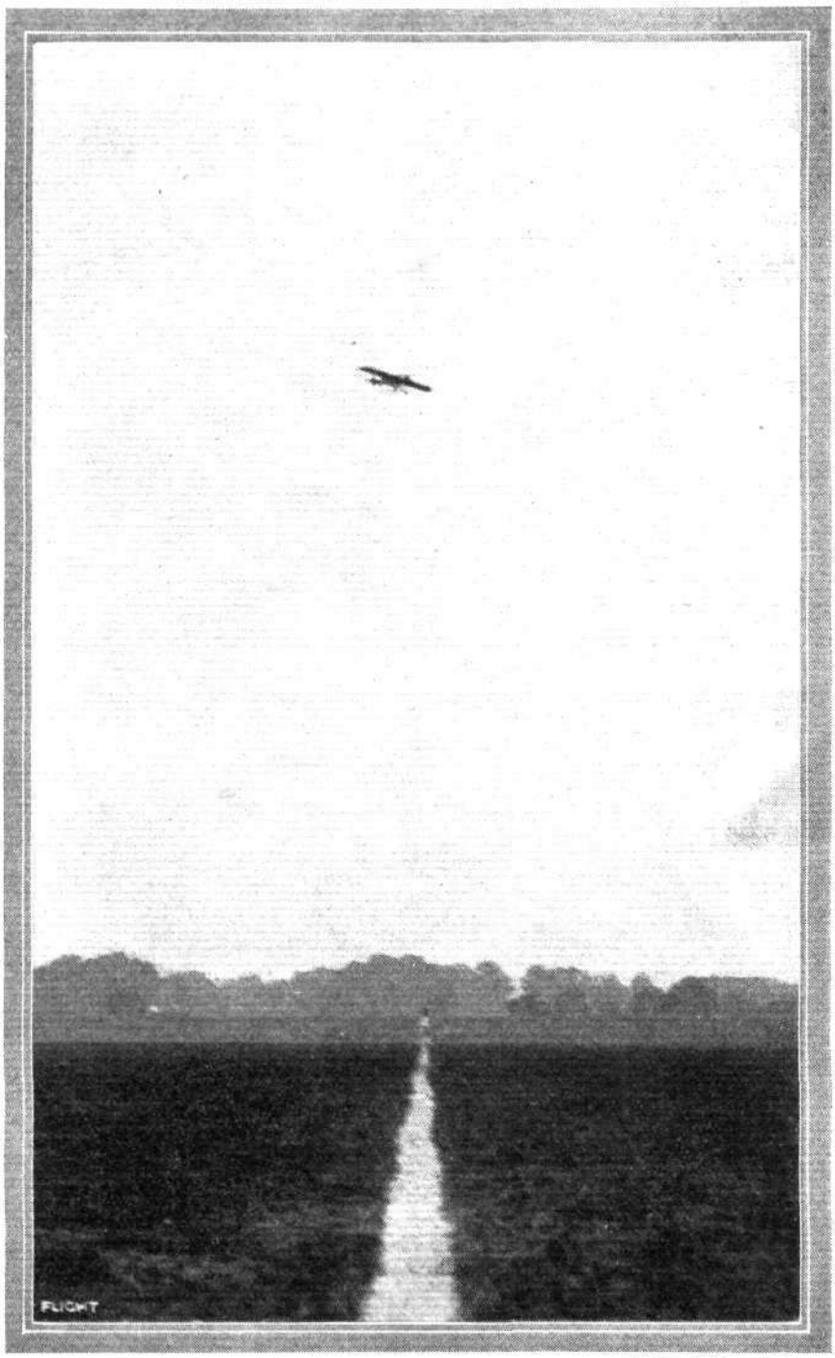
THE AERIAL DERBY.—"Chairing" W. L. Brock, the winner, after his victory.

a fortnight previous, originally set apart for this event. Throughout the greater part of the day threatening clouds hung about low down, and a heavy mist enveloped the ground at almost every part of the course, especially at West Thurrock on the Thames. Under the circumstances, therefore, it is not surprising that out of the eleven starters only four completed the course ; rather the other way about, the wonder is that any were able to finish at all. Of course, as soon as the race was over the weather cleared up, so had the start been delayed an hour or so, there might perhaps have been a more exciting finish. Hendon was all agog in the morning, and many of the spectators turned up early. Shortly after noon, Howard Pixton arrived from Brooklands on the 80 h.p. Sopwith Tabloid, H. Barnwell following shortly after on the 100 h.p. "Schneider Cup" Sopwith. A little later on Jack Alcock arrived with a passenger on the 100 h.p. Sunbeam-Maurice Farman. Just before 2 o'clock R. J. Lillywhite gave an exhibition flight on the 50 h.p. G.-W. bi-rudder 'bus, whilst three of the Derby competitors made trial flights. These were Louis Noel on the 80 h.p. Morane-Saulnier, Verrier on an 80 h.p. Henry Farman, and Filip Bjorkland on his 50 h.p. Blériot monoplane. The latter is the identical machine flown by W. B. R. Moorhouse in the first Aerial Derby, when he obtained third place. Another machine was then seen approaching from Brooklands, which proved to be a standard 80 h.p. Sopwith, with Victor Mahl as pilot, and a passenger. Mahl reported the weather as being thick and bumpy. Verrier then took up a lady passenger on the Henry Farman, and executed some of his daring stunts. The next flight was made by J. L. Hall on his 50 h.p. Avro, N. Howarth following him on the bi-rudder 'bus. Alcock also made a test flight with a passenger on the Sunbeam-Maurice Farman. Further test flights were then made by R. H. Carr on an 80 h.p. Henry Farman, and L. A. Strange on the 80 h.p. Blériot ; both carried passengers. Bjorkland and Hall each made another flight on the Blériot and Avro respectively, whilst W. Birchenough made a test on the 70 h.p. Maurice Farman, and Lillywhite took up a passenger on the bi-rudder 'bus. E. Baumann next made a short flight on a 50 h.p. Wright, and Hall ascended once more on his Avro. Lord Carbery then made a short test flight on his 80 h.p. Morane-Saulnier, and Lillywhite and Verrier ascended on the bi-rudder 'bus and a Maurice Farman respectively, after which the competing machines were lined up ready for the start of the great race round London. Only 11 machines out of the 21 entered took their place for the start, as there had been several scratchings at the last moment. Amongst these were F. P. Raynham, whose 80 h.p. Avro Scout was placed *hors de combat* during trials at Brooklands ; W. R. Ding, with his 100 h.p. Handley Page biplane, who was unable to get back in time from Bath, where he has been giving exhibition flights ; and F. W. Goodden. The Bristol and Martinsyde machines did not leave Brooklands owing to the bad weather. The Grahame-White tractor biplane, to be piloted by R. H. Carr, was withdrawn, and Carr took over Louis Noel's 80 h.p. Henry Farman, Noel taking No. 13, Morane-Saulnier, which was without a pilot. R. H. Barnwell, who was to have flown a Vickers biplane, took charge of Pixton's 100 h.p. Sopwith Tabloid, Pixton having instead the 80 h.p. Sopwith. The eleven competitors, therefore, started as under, the first man starting at 4.16 p.m., the others following at about one-minute intervals :—

1. Filip Bjorkland, 50 h.p. Blériot monoplane.
2. W. Birchenough and passenger, 70 h.p. M. Farman biplane.
5. R. H. Carr with A. E. Barrs, 80 h.p. H. Farman biplane.
6. P. Verrier with passenger, 80 h.p. H. Farman biplane.
8. L. A. Strange, 80 h.p. Blériot monoplane.
9. J. Alcock with H. Lane, 100 h.p. M. Farman biplane.
12. W. L. Brock 80 h.p. Morane-Saulnier monoplane.
13. Louis Noel, 80 h.p. Morane-Saulnier, monoplane.
14. Lord Carbery, 80 h.p. Morane-Saulnier monoplone.
18. H. Pixton, 80 h.p. Sopwith biplane.
21. R. H. Barnwell, 100 h.p. Sopwith biplane.

Each competitor made a complete circuit of the aerodrome before starting on his journey. All got away without incident, but it was not until the two Sopwiths started that the spectators showed their enthusiasm — and no wonder, too, for the way in which these little biplanes "hurtled" round the aerodrome was truly remarkable. They banked at the pylons almost vertically, and climbed sideways in doing so some considerable amount. The 100 h.p. Sopwith was fitted with a new chassis, consisting of two pairs of V struts, which looked much more business-like than the old one. So misty was the air that all the machines were soon lost to view, whereas last year most of the competing machines remained in view for some time. When all had got away the remaining Hendon pilots endeavoured to keep the spectators amused with numerous exhibition and passenger flights. Grahame-White took up two passengers on the



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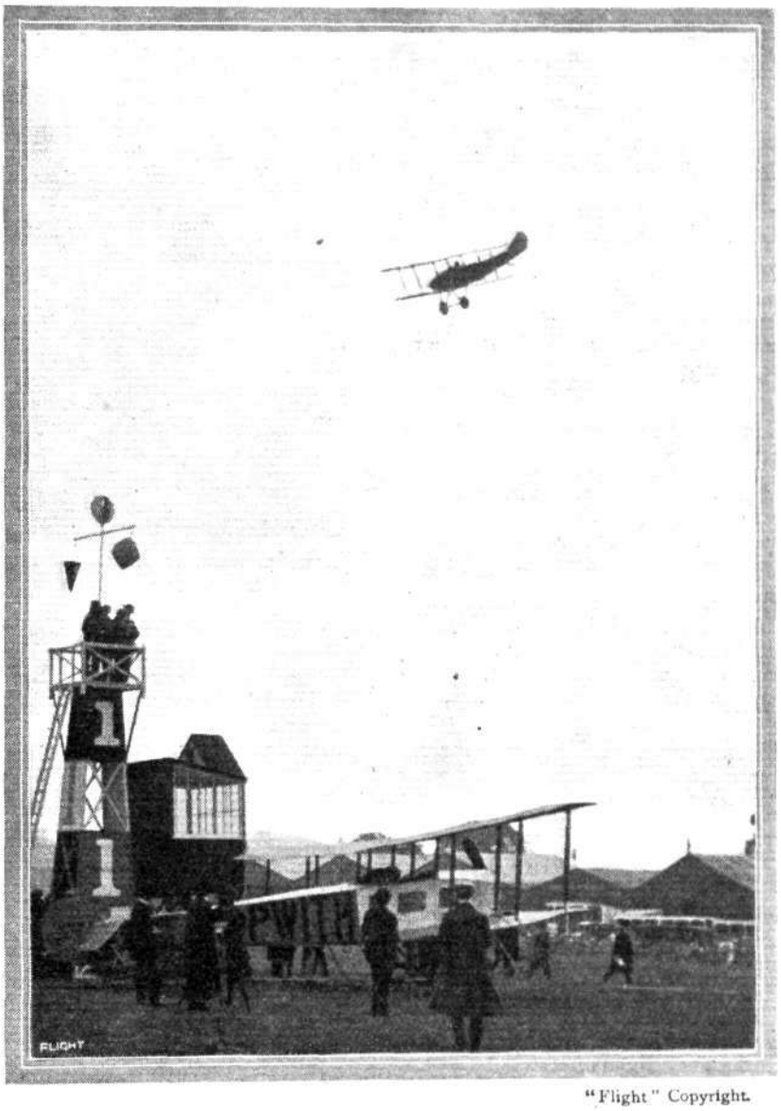
THE FINISH OF THE AERIAL DERBY AT HENDON.—Mr. W. L. Brock passing over the finishing line on his Morane.

100 h.p. five-seater aerobus, Lillywhite was busy on the bi-rudder 'bus, whilst Baumann and Hall went up on the Wright and Avro biplanes respectively. A message was then received to the effect that with the exception of Birchenough and Lord Carbery all the competitors had passed the Epsom control. Excitement started when at about 5.15 p.m. a message was received from West Thurrock saying that Carr passed the control followed by Brock and Barnwell, but there was no news of any of the others, and many feared that some of the competitors must have come to grief. Presently, however, news was received of some of the missing airmen. Bjorkland had landed at Epsom racecourse owing to engine trouble, Birchenough had landed in Richmond Park, Strange had to descend at West Wickham, in Kent, Alcock flew on to Brooklands from Epsom, and Pixton also gave up, but had to descend at Addington, near Croydon, on returning to Brooklands.

Shortly after 5.30 p.m. a machine was seen approaching from the direction of Golders Green. This turned out to be No. 13 Morane, piloted by Louis Noel, who after crossing the line put up a couple of circuits of the aerodrome before landing. He reported that he saw nothing at all owing to the mist, and was not sure that he had passed all the controls, but thought he had. After leaving Epsom he only saw one or two of the other competitors now and again. Some three minutes after his arrival another Morane was seen approaching, in the right direction this time, which proved to be Brock's. Brock said he also had trouble in finding his way, but managed to pass each control all right. The question was, therefore, who was the winner? Both got a grand reception — especially from photographers and "cine-men"—but it was doubtful as to whether Noel had passed all the controls correctly, so that there was nothing for it but to await the reports of the observers. In the meanwhile Brock was considered the winner by a number of enthusiasts, and was "chaired," until the approach of another competitor claimed all attention. The machine was obviously a Henry Farman, but it was not until it entered the aerodrome that we saw by the new steel chassis it was Carr's. Immediately after, Lord Carbery's Morane arrived on high from the direction of London, and when above the aerodrome he executed a turnover and then landed. He had had a most exciting time of it. He lost his way near West Thurrock and landed at Purfleet; from here he started off to return to Hendon, but once again lost his bearings. Eventually seeing a large open space he decided to land, and he did—on Hampstead Heath! Naturally, he was surrounded by a large crowd, but with the help of the police and a bystander who swung the propeller, he managed to get off safely and resume his journey to Hendon. Some four minutes after Carr came Verrier, who after crossing the line, executed some hair-raising stunts.

All were now home, for news had come to hand that Barnwell had given up after passing West Thurrock and had landed at Brooklands at 6.20 p.m.



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R. H. Barnwell, the scratch man and the last man to leave in the Aerial Derby, just off from Hendon Aerodrome on the Sopwith biplane on Saturday last.

The progress *en route*: *1st Control*, KEMPTON PARK.—The competitors passed this control in a bunch, Brock leading, followed by Carr, Pixton, Verrier, Barnwell, and Noel.

2nd Control, EPSOM.—Brock was still leading, Barnwell and Pixton being close behind. About two minutes later came Carr, Noel and Lord Carbery, followed a minute later by Verrier and Bjorkland, the latter landing on the race course. Alcock flew on to Brooklands.

3rd Control, WEST THURROCK.—It was very thick just here, and the observers had great difficulty in seeing the competitors. Some were heard, but not seen. Those observed were Carr, Brock and Barnwell.

4th Control, EPPING.—The machines flew very wide here also, one monoplane branching off in the wrong direction. Brock was leading with Noel close behind, Carr and Verrier following.

5th Control, HERTFORD. — Only Brock, Carr and Verrier were observed here, flying high.

Everyone will sympathise with Louis Noel on his bad luck, for except in missing the marks at West Thurrock and Hertford, he flew an excellent course neck and neck with Brock. Mr. D. Thorburn, the official observer at Hertford, says that he thinks that Noel must have mistaken the intersecting paths at Haileybury College, Broxbourne—which lies south-east of Hertford—for the official mark, and thus turned just inside the latter. This would also account for the direction from which he entered the aerodrome.

Immediately after the race, Lord Carbery ascended to some 1,000 ft. and executed three loops and some tail slides, whilst Noel took up a lady and gentleman on the Henry Farman, which is provided with two passenger seats. Verrier also went up on the Maurice Farman and flew with hands off, and Brock made a final flight on the Morane. At 6.37 p.m., Victor Mahl left for Brooklands accompanied by two passengers, and then the proceedings were brought to a close with flights by Lord Carbery on the Morane, Baumann with a passenger on the Wright, Noel with a passenger on the Henry Farman, and Howarth on the bi-rudder 'bus.

The attendance at the aerodrome was remarkably good considering the weather was somewhat threatening. Among the visitors in the paddock were the following notable personages:—Prince Alexander of Battenberg, the Grand Duke Michael, Countess Torby, Lady Idena Wallis, Lord and Lady Curzon, Sir Archibald Sinclair, Lord and Lady H. de Trafford, and Lady Carbery.

RESULT OF AERIAL DERBY.

1st Prize: *Daily Mail* Gold Cup and 200 Sovs. ("Shell").

		h.	m.	s.
1.	W. L. Brock (80 h.p. Morane monoplane) ...	1	18	54
2.	R. H. Carr (80 h.p. H. Farman biplane) ...	1	46	27
3.	P. Verrier (80 h.p. H. Farman biplane) ...	1	49	50
	Disqualified: Louis Noel (80 h.p. Morane)	1	15	9

Sealed Handicap for "Shell" Trophy and 100 Sovs.

2nd Prize: 75 Sovs. 3rd Prize: 25 Sovs.

Handicaps:

	m.	s.		m.	s.		m.	s.
Birchenough	48	21	Carr ...	33	34	Carbery ...	17	6
Bjorkland ...	40	51	Strange ...	29	46	Pixton ...	6	20
Verrier ...	36	51	Noel ...	20	54	Barnwell ...	scratch	
Alcock ...	34	51	Brock ...	20	24			

Result.	Handicap Time. h.	m.	s.
1. W. L. Brock	0	58	30
2. R. H. Carr	1	12	53
3. P. Verrier	1	12	59

The London-Manchester-London Race.

ARRANGEMENTS are now well in hand for this event, which is to take place on Saturday, 20th inst. The total distance to be flown is 324 miles, and there are compulsory stops amounting to two hours. The course is:—

Start.—Hendon Aerodrome.

1st Stop.—Birmingham, Castle Bromwich Playing Fields. 92 miles from start. 30 mins. stop.

2nd Stop.—Manchester, Trafford Park. 162 miles. 1 hour's stop.

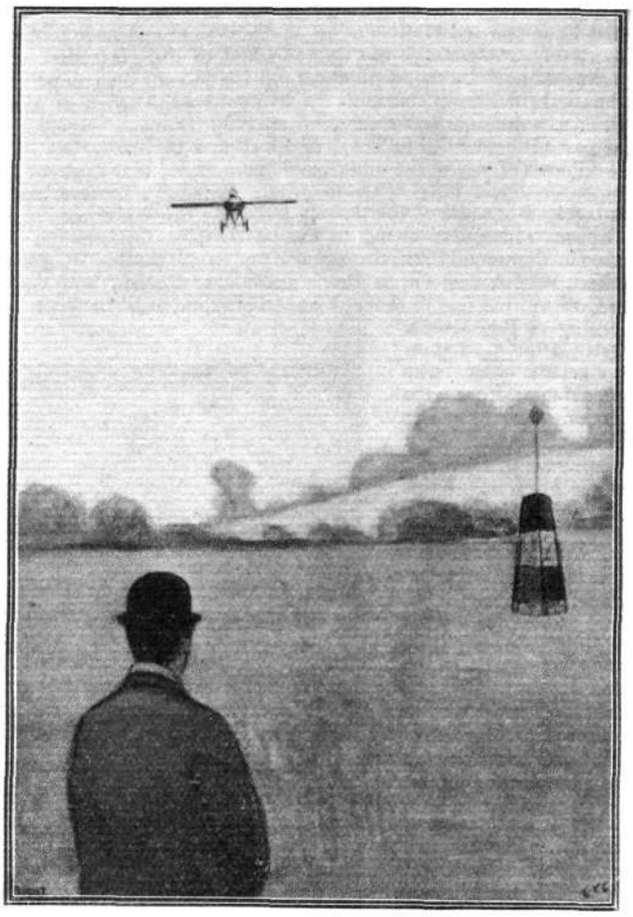
3rd Stop.—Birmingham, Castle Bromwich Playing Fields. 232 miles. 30 mins. stop.

Finish.—Hendon Aerodrome. 324 miles.

The first competitor will start from Hendon Aerodrome at 8 a.m., and the winner is expected back about 5 p.m. The competitors are expected to be arriving at and departing from the Birmingham control between 9.30 a.m. and 4.30 p.m.; while at Manchester, where there will also be public enclosures, the pilots are expected to be arriving and departing between 11 a.m. and 3.30 p.m. If no competitor has completed the course by 10 p.m. the promoters of the contest have the right to extend the period or to declare the race off.

The entries already received are: W. L. Brock (80 h.p. Gnome-Morane), R. H. Carr (80 h.p. Blériot or 80 h.p. H. Farman), P. Verrier (80 h.p. H. Farman), L. Noel (80 h.p. Gnome-Morane), Lord Carbery (80 h.p. Rhone-Morane), J. Lillywhite (50 h.p. Grahame-White).

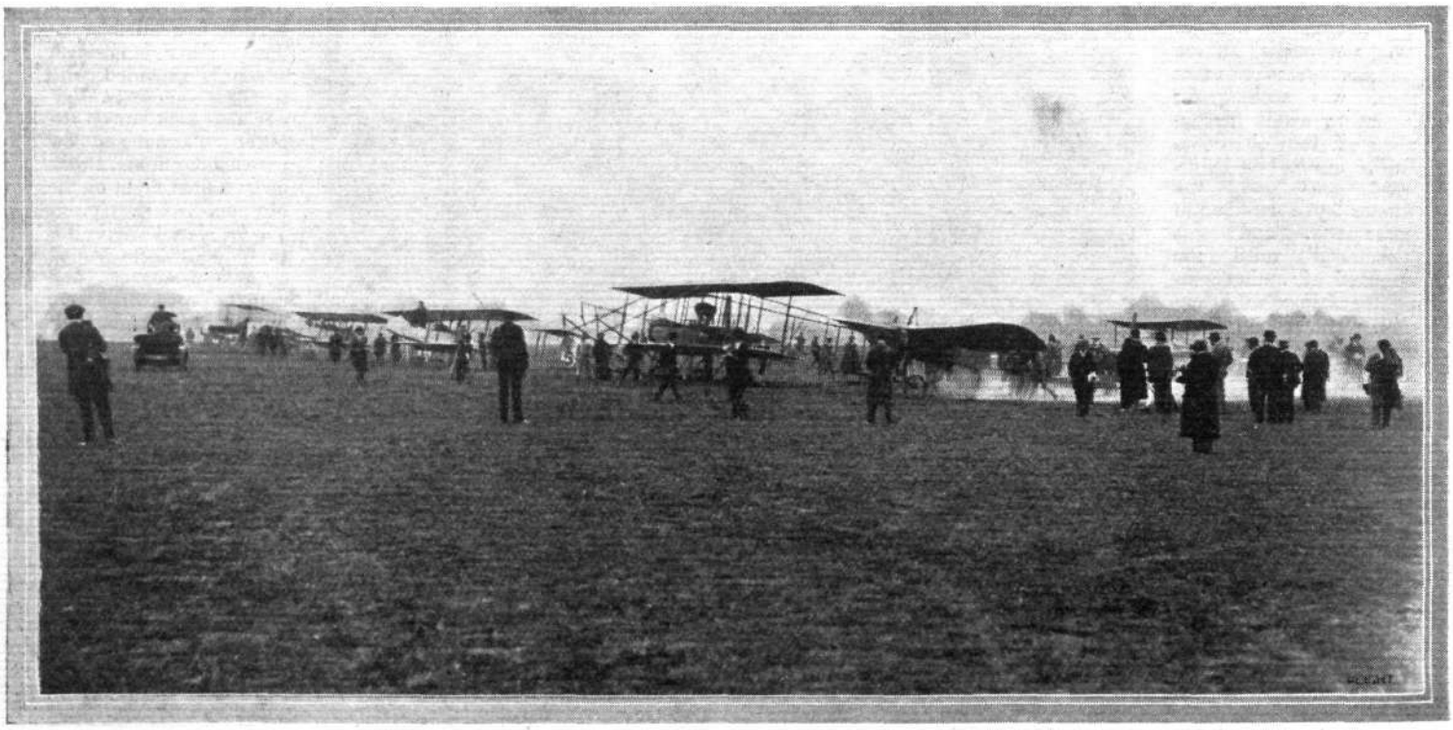
The pilot who completes the whole course in the fastest time will be awarded the *Daily Mail* gold trophy and £400. In addition there will be a first prize—"Pratt's" trophy and £250—and a second prize of £100 for a handicap in connection with the race. The cash prizes are presented by the Anglo-American Oil Company



The first man to return to Hendon Aerodrome in the Aerial Derby.—Louis Noel on his Morane.

—the distributors of Pratt's Motor Spirit—in commemoration of the Anglo-American Peace Centenary.

Entries close at noon on Monday, and should be sent to the Secretary, Hendon Aerodrome, N.W.



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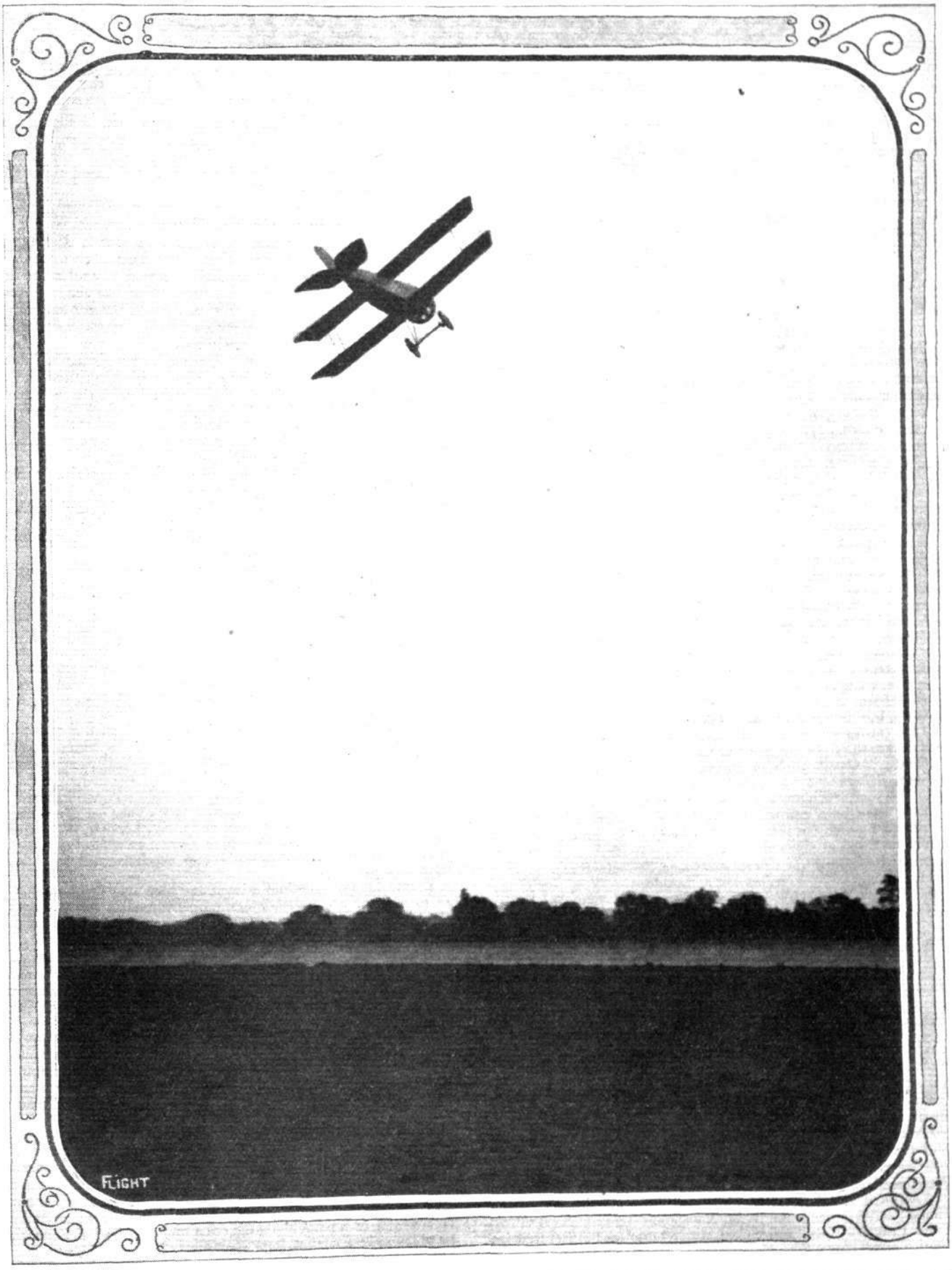
THE START FOR THE AERIAL DERBY AT HENDON AERODROME.—Filip Bjorkland running his engine on his Blériot just prior to getting away.



Mr. S. V. Sippe on the Bristol Scout at Brooklands Aerodrome.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Diary of Events.

June 13 ... Race for Manio Cup. Hendon Aerodrome.
June 20 ... *Daily Mail* Air Race. London–Manchester–London. Hendon Aerodrome.
June 27 ... Balloon Race. Hurlingham Club, Fulham, S.W.
July 11 ... International Correspondence Schools Race, London–Paris–London. Hendon Aerodrome.
July 11 ... Balloon Race. Hurlingham Club, Fulham, S.W.
Aug. 1–15 *Daily Mail* £5,000 Circuit of Britain Race. Starting from Southampton Water.
Aug. 22–29 Gordon-Bennett Eliminating Trials. Salisbury Plain.
Sept. 19–28 Gordon-Bennett Aviation Race. Buc, France.

HENDON AERODROME.

Members of the Royal Aero Club are admitted free to the Hendon Aerodrome on presentation of their Club Membership Cards. The Membership Card admits the Member only—motor cars must be paid for.

Daily Mail £5,000 Circuit of Britain Race.

The following entries have been received :—

Messrs. White and Thompson—
1. Curtiss Biplane. Two 100 h.p. Curtiss engines. Pilot: Mr. A. Loftus Bryan.
2. Curtiss Biplane. 125 h.p. Anzani engine. Pilot: Capt. Ernest C. Bass.

Sopwith Aviation Co., Ltd.—
1. Sopwith Biplane. 150 h.p. Sunbeam engine. Pilot: Mr. C. Howard Pixton.
2. Sopwith Biplane. 100 h.p. English *monosoupape* Gnome engine. Pilot: Mr. H. G. Hawker.

Grahame-White Aviation Co., Ltd.—Grahame-White Biplane. 100 h.p. English *monosoupape* Gnome engine.

Messrs. A. V. Roe and Co., Ltd.—Roe Biplane. 150 h.p. Sunbeam engine. Pilot: Mr. F. P. Raynham.

Eastbourne Aviation Co., Ltd.—Tractor Biplane. 120 h.p. Green engine. Pilot: Mr. F. B. Fowler.

Blackburn Aeroplane Co., Ltd. — Blackburn Hydro-Biplane. 130 h.p. Salmson engine. Pilot: Mr. Sydney Pickles.

Late entries will be received up to 12 noon, June 30th, 1914, in which case the Entrance Fee will be £150.

Rule 4, "Qualification of Aircraft," has been revised and now reads as follows :—

The complete aircraft and all its parts, including the motor, must have been entirely constructed within the confines of the British Empire, but this provision shall not be held to apply to raw material, *or the magneto.*

International Correspondence Schools Race. London–Paris–London.

(*Under the Competition Rules of the Royal Aero Club.*)

Organised by the Royal Aero Club and the Aero-Club de France.

Starting and finishing at the Hendon Aerodrome, Hendon, N.W.

SATURDAY, JULY 11TH, 1914.

PRIZES.

Fastest Time... 1st Prize: £500. Presented by the International Correspondence Schools.

Handicap ... 1st Prize: £300. Presented by the Royal Aero Club. 2nd Prize: £150. Presented by the International Correspondence Schools. 3rd Prize: £50. Presented by the International Correspondence Schools.

The Entrance Fee is £5 per aircraft, and entries will be received up till 12 noon, Saturday, June 27th, 1914. Late entries will be received up to 12 noon, Saturday, July 4th, 1914, in which case the Entrance Fee will be £10.

The Entrance Fee will be returned to each competitor who completes the course by 10 p.m. on Saturday, July 11th, 1914.

The Entry Form, which must be accompanied by the Entrance Fee, must be sent to the Secretary of the Royal Aero Club, 166, Piccadilly, London, W.

Full particulars and entry forms can be obtained from the Secretary, Royal Aero Club, 166, Piccadilly, London, W.

The British Empire Michelin Cup No. 2, £800.

(*Under the Competition Rules of the Royal Aero Club.*)

The Michelin Tyre Company has presented to the Royal Aero Club of the United Kingdom for competition, the sum of £800, to which will be added a trophy to be retained by the winner.

The following are the regulations governing the competition :—

Regulations.

1. The winner shall be the entrant of the aeroplane which, on or before midnight, October 31st, 1914, shall have remained the longest time in the air in one flight without touching the ground. The flights may be made at any time and there is no restriction as to night flying but in this case a light must be carried to enable the flight to be observed. In order to qualify for the prize a continuous flight of at least ten hours must be made.

2. Any flying ground in the British Isles licensed by the Royal Aero Club may be used and all attempts must be made in the presence of the official or officials appointed by the Royal Aero Club.

3. The flights must be made in a closed circuit, and two barographs, set and sealed by the official prior to the start, must be carried. Competitors must supply the barographs.

4. The time will be reckoned from the moment of crossing over the starting line in actual flight to the moment of alighting. The alighting must be in sight of the official, failing which, the time will be taken up to the last moment when the aircraft was identified as being in flight by the official.

5. Both the entrant and pilot must be duly entered on the Competitor's Register of the Royal Aero Club. The pilot must be a British Subject, holding an Aviator's Certificate issued by the Royal Aero Club or other Club affiliated to the International Aeronautical Federation.

6. The complete aircraft, and all its parts, including the motor, must have been entirely constructed within the confines of the British Empire, but this provision shall not be held to apply to raw material or the magneto.

7. An entrance fee of £1 must accompany every notification of an attempt, and at least three clear days' notice must be given to the Secretary, Royal Aero Club, 166, Piccadilly, London, W. A competitor must further deposit a sum of £10 on account of expenses, if any, of officials. Any balance not so expended will be returned to the competitor.

8. Should any questions arise at any time after the date of entry as to whether a competitor has properly fulfilled the regulations, or should any other question arise in relation to them, the decision of the Royal Aero Club shall be final and without appeal.

9. A competitor by entering waives any right of action against the Royal Aero Club or the Michelin Tyre Co. for any damages sustained by him in consequence of any act or omission on the part of the officials of the Royal Aero Club or the Michelin Tyre Co., or their representatives or servants, or any fellow competitor.

10. The aircraft shall at all times be at the risk in all respects of the competitor, who shall be deemed by entry to agree to waive all claim for injury either to himself or his aircraft, or his employees or workmen, and to assume all liability for damage to third parties or their property, and to indemnify the Royal Aero Club and the Michelin Tyre Co. in respect thereof.

11. The Royal Aero Club reserves itself the right to add to, amend, or omit any of these regulations should it think fit.

166, Piccadilly, W. HAROLD E. PERRIN, Secretary.

Prohibited Areas Opened.

AMENDING orders, dated May 25th, have been issued by the Home Secretary under the Aerial Navigation Acts which (1) substitute "Crayford Ness" and "Coal House Fort" for Purfleet Railway Station and Tilbury Fort respectively as centres of prohibited areas, thus affording a free passage of about three miles across the River Thames to the East of London at West Thurrock ;

(2) Add "North Killingholme Haven" to the list of prohibited areas ;

And (3) prescribe an additional area in the Folkestone neighbourhood, from a point along the coast one mile South-West of Dymchurch to a point along the coast one mile East of Folkestone, in which aircraft coming from abroad may land.

The wording of the regulation as to signalling has also been slightly altered and it now reads as follows :—

The Officer to cause the signals to be given and take the action mentioned in the said section shall be a commissioned officer in His Majesty's Naval or Military Forces.

FLIGHT

FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Eastchurch Flying Grounds.

Naval Flying.—Whit-Monday, windy, fine. There was only one machine up, most of the Naval pilots being on leave—34 Short, Lieut. Finch-Noyes, to Farnborough.

Tuesday, fine. Nos. 49 B.E., 43 Bristol tractor, 64 Short, 2 Short, 45 Caudron were up.

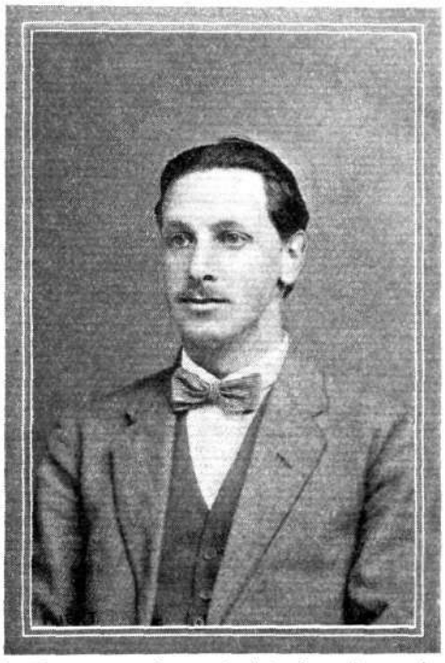
Wednesday, fine. Nos. 188 Maurice Farman, 50 B.E., 31 Henry Farman, 43 Bristol tractor, 64 Short were flown. 154 D.F.W. Arrow biplane, with Lieut. Collet, arrived from Brooklands.

Thursday, fine, rather windy. Nos. 188 Maurice Farman and 154 D.F.W. to Isle of Grain; Nos. 64 Short, 1 Short, 43 Bristol tractor, 49 B.E., 31 Henry Farman, 45 Caudron. Lieut Collet looping the loop.

Friday, fine, rather windy. Nos. 188 Maurice Farman, 43 Bristol tractor, and 31 Henry Farman were the only machines up.

Saturday, fine, windy. Nos. 43 Bristol tractor, 150 Avro, 1 Short. The First Lord visited the aerodrome on Thursday, Friday and Saturday, and had flights with Com. Samson.

Civilian Flying.—Mr. Alec Ogilvie was out twice during the week on his 50 h.p. N.E.C. engined Wright, and on both machines,



Mr. T. S. Duncan, who took his *brevet* at the Vickers Flying School, Brooklands, on May 30th.

25 and 50 h.p. on Sunday. Mr. Leo Jezzi was out on Whit-Monday on his 35 h.p. Little Jap, also on Sunday, making a couple of fine flights.

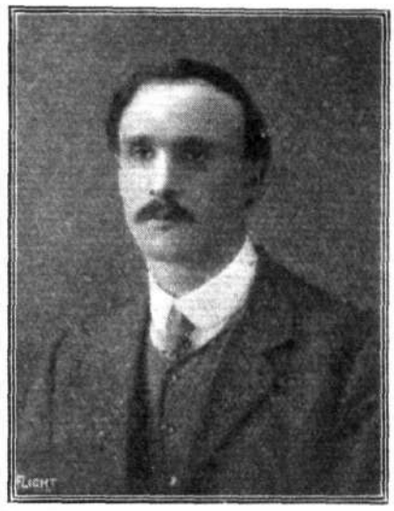
Brooklands Aerodrome.

ON Tuesday afternoon, last week, Mr. Dukinfield Jones was testing the engine of the D.F.W. Mr. Pixton flew to Farnborough on a Sopwith "Scout." Mr. Mahl with a passenger also flew to Farnborough on the two-seater Sopwith, bringing back two passengers with him. Mr. Sippe was out on the Bristol "Scout." Mr. Gower was flying a 50 h.p. Blériot, and Mr. Alcock the 100 h.p. Sunbeam. The Bristol, Blériot and Vickers pupils out. In the afternoon, Mr. Jones out on another D.F.W.

Lieut. Collet, R.N., flew to Eastchurch on the D.F.W., on Wednesday morning. Mr. Gower on a 50 Blériot and Mr. Alcock on the 100 Sunbeam both flew to Sunbury on Thames to be present at the first airmen's picnic held in this country. Mr. Sippe with a passenger on the Bristol tractor circled round the scene of the picnic, but had no time to land and join the picnickers. Mr. Mahl across country on the 80 Sopwith. Mr. Pixton on a Sopwith "Scout" to Farnborough. Mr. Waterfall for a couple of flights on the Martinsyde. Blériot, Vickers, and Bristol pupils out.

On Thursday morning, Bristol, Vickers, and Blériot pupils out. Monsieur Cuendet with a passenger flew to Farnborough and delivered two-seater Blériot to R.F.C. Mr. Alcock with passenger to Sunbury and Epsom. Mr. Sippe out on Bristol tractor in the afternoon. Monsieur Cuendet with passenger to Farnborough again to deliver another two-seater Blériot to R.F.C.

Vickers and Bristol pupils out on Friday morning. Monsieur Cuendet with passenger for three-quarters of an hour's flight on two-seater Blériot, which he afterwards delivered to R.F.C. at Farnborough. Arrival of Avro "Scout" and two standard 80 h.p. tractors. In the afternoon Mr. Mahl on 80 Sopwith, Mr. Pixton



Mr. Reg. Max Murray, who this month took his *brevet* on the Vickers biplane at the Vickers School, Brooklands. His spiral descent was from 3,200 ft.

on Sopwith "Scout," Mr. Waterfall on Martinsyde, Mr. Alcock on 100 Sunbeam, and Mr. Wilberforce on 45 h.p. Anzani-Blériot; also Mr. Raynham on Avro "Scout" and Mr. Sippe on Bristol "Scout." Blériot, Bristol, and Vickers pupils out.

Saturday morning, Vickers and Bristol pupils out. Mr. Steinbach passed his *brevet* tests in good style on a Vickers biplane. Mr. Alcock on 100 h.p. Sunbeam, Mr. Pixton on Sopwith "Scout," and Mr. Barnwell on 100 h.p. Sopwith to Hendon for Aerial Derby. Mr. Waterfall on Martinsyde, and Mr. Sippe on Bristol "Scout." In the afternoon, Mr. Mahl to Hendon on 80 h.p. Sopwith, Mr. Sippe on Bristol "Scout," and Mr. Dukinfield Jones on

Mr. J. R. Howett, who has just taken his Royal Aero Club *brevet* at the Grahame-White School, Hendon.

D.F.W. Mr. Alcock and Mr. Barnwell abandoned race owing to fog and returned to Brooklands, Mr. Pixton having also given up and landed at Croydon.

Mr. Hawker (who only arrived home from Australia on Saturday night) was first out Sunday afternoon on the two-seater Sopwith,

afterwards going out on the 100 h.p. Sopwith, flying in quite his old style. Mr. Sippe was out on the Bristol "Scout" at the same time as Mr. Hawker on the 100 h.p. Sopwith, the two machines affording a fine spectacle under the skilful management of their respective pilots. Mr. Mahl took up a number of passengers, and ultimately left with two passengers for Lord Burnham's place—Hall Barn, near Beaconsfield.

Bristol School.—Monday, last week. Stutt and Sippe both entered for the Brooklands Handicap Race, the former securing the second prize.

Passenger tuition to Lieut. Nugent, Mr. Rutledge and Mr. Charlesworth, Tuesday. Solos by Lieut. Richard, Capt. Walcot, Mr. Eastwood and Mr. Gresley.

Wednesday, passenger tuition to Mr. Rutledge (4), Mr. Charlesworth (3), and Mr. Lucas (2), the weather being too bad for solo flying.

Pupils taken as passengers Thursday: Mr. Lucas, Mr. Charlesworth (2), and Mr. Rutledge. Too windy for further work.

Friday, Mr. Charlesworth received one passenger flight, but the rain then prevented further tuition.

Passenger tuition Saturday to Mr. Gresley and Mr. Chambers, but no further work was possible owing to the very bad weather.

Vickers School.—Tuesday last week, pilots at work: Barnwell, Knight, Elsdon, Webb. With pilot: Messrs. Klingenstein and Miller. Lieuts. Eberli and Tennant, and Messrs. Parker, Wilson and Steinbach solos.

Wednesday, with pilot: Lieut. Gillman and Messrs. Klingenstein and Miller. Lieuts. Eberli and Tennant and Messrs. Parker, Wilson and Steinbach solos.

Thursday, with pilot: Messrs. Miller and Klingenstein. Lieut. Gillman, Messrs. Wilson, Miller and Steinbach solos.

Friday, with pilot: Messrs. Klingenstein and Miller and Lieut. Gillman. Lieut. Tennant and Messrs. Parker and Wilson solos; also Mr. Steinbach.

Saturday, Mr. R. Steinbach for *brevet* on biplane, getting through in fine style.

Liverpool Aviation School, Waterloo.

J. CREAN has not been out since May 19th, when he did some short hops, after which he went off to play polo, where he managed to put out his shoulder. Osborne-Groves started on 3rd inst. rolling, but had to stop on account of wind. On the 8th, rolling again and getting good control of machine, when caught by a gust was lifted off the ground and finished with a *piqué* and complete somersault, but was unhurt owing to wearing a safety belt.

Wind has been consistently bad since beginning of May, and the two-seater has only been out for trial runs with the new Isaacson on May 22nd and 27th and June 3rd. The machine flies well with this engine, the chief trouble being with the plugs; the new mica plugs have so far given good results.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Tuesday last week, Mr. Shepherd and Major Peck straights with Instructor Howarth in passenger's seat. Messrs. Weber, Boyesen, Cowley, and Howett circuits, figures of 8, &c., afterwards Messrs. Cowley and Howett going in for *brevet* tests, Mr. Howett passing tests, Mr. Cowley to complete last part of tests.

Wednesday, Major Peck, Messrs. Liu, and Dunne straights with Instructors Howarth, Lillywhite and Barrs. Messrs. Palmer, Shepherd, Wyles and Gruning also straights with instructors. Messrs. Winter, Boyesen, Robinson, solo circuits, &c., Mr. Cowley going in for last part of *brevet* tests and gaining certificate.

Thursday, Major Peck, Messrs. Wyles, Liu and Dunne straights with Instrs. Birchenough and Howarth. Mr. Weber first and second parts of *brevet* tests.

Friday, Messrs. Liu, Dunne, Shepherd, and Palmer straights with Instrs. Howarth and Barrs. Mr. Boyesen circuits, figures of eight, &c. Mr. Lowe solo straights, Mr. Weber altitude tests for *brevet*, Mr. Winter solo circuits.

Beatty School.—Pupils on Wright dual-control biplane with M. Baumann, Instructor. Messrs. Ruffy 15 mins., Cheung 17, MacLachlan 15, Bentley 8, Elverson 12, Allen 12, Capt. Bass 32, Lieut. Maguire 52. Mr. Watts doing circuits by himself.

Hall School.—Sunday, last week, J. L. Hall on Avro at varying altitudes.

Whit-Monday, J. L. Hall, on Avro, flew over to Hanger Hill grounds at Acton with passenger, later returning to aerodrome at 2,000 ft. H. C. G. Allen straights on his 35 h.p. Blériot.

Too windy for pupils alone on Tuesday, J. L. Hall giving instruction on dual-control Avro. Miss D. Clifford half-hour at 2,000 ft. practising straight flights. J. H. Rose circuits at 1,000 ft., having the Avro in complete control.

Windy and bad *remous*, Wednesday. J. L. Hall on Avro passenger carrying.

Thursday and Friday, a gale. Saturday, windy in morning. In afternoon J. L. Hall out taking passengers on Avro. In evening wind dropped sufficiently for school practice. Henry Gearing essayed his first circuit, which he covered in excellent style. A. F. Arcier then took No. 1 Caudron up several hundred feet, doing circuits, then landing in graceful *vol plané*. J. Rose made two straight flights before darkness intervened; and H. C. G. Allen performed evolutions on the 35 Blériot.

Shoreham Aerodrome.

Pashley School.—The pupils of the Shoreham flying school have all made very rapid progress during the week, thanks to the greatly improved weather. Three pupils, Messrs. R. P. Cannon, P. Maskall and A. Maskall, passed their certificate tests in splendid style. Each did the eights at 600 ft. and *vol plané* from 500 ft. to 750 ft., the latter being done by R. P. Cannon.

Mr. Derick Aikman, another pupil, has done splendid flights at 800 ft., including figures of eight, and Messrs. Hayland-Wilson, Sievier and Purnell have done a number of circuits, being now ready for eights.

Mr. Sholto Douglas has advanced splendidly, doing very steady flights alone, and controlling long flights with the instructor, Mr. W. H. Elliott.

During the week Mr. Elliott, with Mr. England as passenger, flew to Horsham and back at a height of about 2,000 ft., making only a short stay at Horsham.

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TO GUSTAV HAMEL.

Ave atque Vale!

Hast thou indeed flown, marvellous boy,
Wafted beyond our ken to the doom decreed,
Leaving our hearts forlorn?

Thy winged soul, a creature of air and flame,
Eager and swift, suckled at Freedom's breast,
Disdained to quaff, ere she stooped to her house of clay,
The wonted cup of oblivion.

Therefore, in exile, remembering bliss foregone,
She brooked ill the bonds of mortality,
Pined for the ampler scope of her native sphere.

Therefore she formed thee and fashioned thee after herself,
Gave thee a mien graciously alien, aloof,
Gave thee the eyes of a prisoner bent on escape,
Gave thee a dauntless heart, an invincible will.

So we beheld thee anon
Soaring and circling superbly aloft,
Easily triumphing over the hosts of the air,
Taking by storm the heaven of thy fame
And the hearts of thy breathless beholders.

But they, the wrathful and envious ones,
The vanquished hosts of the air,
Wayward, capricious, knowing nothing of love,
Knowing thee young and fearless, bided their time
And triumph now in their turn.

Therefore we mourn and thy fellows mourn thee, bereaved.
But thou, suddenly snatched from our sight,
Thy death like a trumpet-call, heard over-sea,
Surely thou heedest our answering cry—Farewell!
Surely thou findest new heights to essay.

Hail, then, and farewell, marvellous boy!

CHARLES J. WHITBY.

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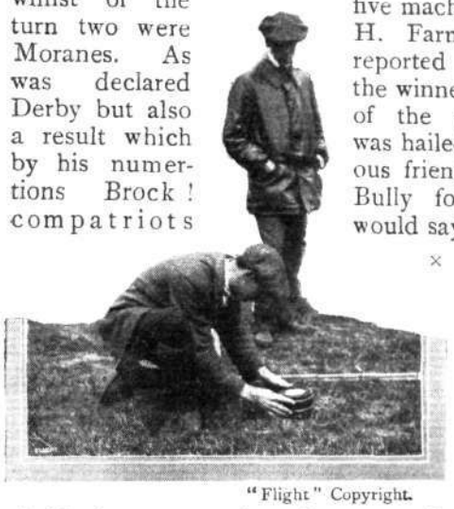
Long Test for Dorand Military Biplanes.

WITH the object of fully testing the armoured biplanes built by the French Army to the designs of Commandant Dorand, an escadrille composed of six of the machines set out from Villacoublay on Monday morning for a long tour of France. The programme comprises six stages with stops at Rheims, Verdun, Chalons Camp, Villacoublay, Dijon, and Villacoublay. The first stage from Villacoublay to Rheims, *via* Soissons, was accomplished by all the machines, the pilots of which are Capt. Leclerc (in command), Adjudant St. Andre, Sergt. Grasset, Corporals Labouchere, Brindejonc des Moulinais and Gastinger. All the machines are fitted with 85 h.p. Anzani motors.

FLIGHT

EDDIES.

A FEW surprises were provided by the Aerial Derby on Saturday last, for which the weather was no doubt mainly responsible. It was a most extraordinary thing how, through some freak of fate, the machines seemed to group themselves together. Of the machines entered, two Martinsydes did not start, two Sopwiths, two Blériots and two M. Farmans did not return to the aerodrome, whilst of the five machines that did return two were H. Farmans and three Moranes. As reported elsewhere Brock was declared the winner not only of the Derby but also of the sealed handicap, a result which was hailed with satisfaction by his numerous friends. Congratulations Brock! Bully for you, as your compatriots would say.



"Flight" Copyright.

L. Noel is interested in the setting of a compass before the start of the Aerial Derby.

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It was hard luck for Raynham that he was unable to start in the race through damaging his machine in a trial flight the previous day. The little Avro scout had been fitted with straight wings, as her speed was found to be not quite up to expectation with the backswept wings with which she made her first appearance a fortnight ago. For last Saturday's Derby the standard type chassis had been replaced by a racing chassis of the very simplest type, so simple, in fact, that no provision had been made for springing the wheels in any way except by the pneumatic tyres, and so when Rayham took the machine out to test the new straight wings the chassis collapsed letting the machine down in a most undignified manner.

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In addition to the little Avro scout, two 80 h.p. Avro two-seaters have arrived at Brooklands whilst several more are expected shortly, all of which are to be tested there before being delivered at Farnborough. In addition to these land machines, which have been ordered by the War Office, two hydros are to be delivered to the Navy shortly. It is gratifying to see that Messrs. A. V. Roe and Co. are now reaping some benefit from their perseverance and pioneer work in the past.

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In these days of pilot-Princes and looping Peers it does not come as a very great surprise to learn of a Princess joining a flying school as a pupil. Princess Ludwig of Löwenstein-Wertheim has evidently been so impressed by her recent flight to France on Mr. Ding's Handley Page biplane, that she has decided to learn the gentle art herself. This I gather from Mr. Handley Page, since the Princess has joined the Beatty flying school at Hendon, her tuition beginning this week-end.

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It is a bit of a mystery to me how Lord Carbery managed to land on Hampstead Heath and get away again last Saturday, when he lost his way flying in the Derby. The ground around that part is anything but level and the Moranes, however excellent they are in the air, cannot be said to be particularly easy to land on very rough ground. The fact that Lord Carbery managed to land and get off again without mishap speaks volumes for his skill in handling his machine.

"Flight" Copyright.

Back view of a private "grand stand" at the Hendon Aerial Derby.

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Mr. T. Elder Hearn had a narrow escape the other day when flying his two-seater Blériot at Childwall. Mr. Hearn had made a flight with a passenger and was returning to the Polo ground when his engine stopped. He was flying very low at the time as there was a mist, and the only suitable field within gliding distance was bordered by a hedge, behind which were a lot of people. Rather than risk running into the public, Mr. Hearn made a sharp turn close to the ground and landed in an adjoining field, smashing his machine; fortunately both he and his passenger escaping practically unhurt. The first question that the passenger asked after the smash was: "When will the machine be repaired, I should like another flight?" Not only so, but he also refused Mr. Hearn's offer to refund his "fare."

"Flight" Copyright.

Mr. Ridley Prentice off from Waterloo on a "flying" visit across the seas to South America and back.

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Mr. Ridley Prentice, whose various interests in the British Anzani Co., the British Emaillite Co., and the G.A.C., &c., have kept him very busy indeed, left Southampton on Friday last bound for Rio Janeiro on a recreation trip, as his health was beginning to feel the effects of overwork. I feel sure that his many friends will join me in wishing him *bon voyage!* Mr. Prentice, of course, received his *baptême de l'air* long ago, but unless he can prove that he has passed the Equator before, he will scarcely avoid quite a different sort of *baptême*, if customs on board ship continue as of old. May he return all the better for his trip!

Mr. Harry Hawker, whose excellent flying in last year's waterplane Circuit of Britain will still be remembered, was back again in this country from Australia on Saturday last. When Mr. Hawker went out to Australia last summer he took with him the first scouting biplane of the small fast type turned out by the Sopwith Aviation Co. On this he has been getting through a great amount of flying in his native land, and has thereby helped in no small measure to arouse interest in aviation among his compatriots. Mr. Hawker has, it will be remembered, been entered as the pilot of one of the Sopwith machines for this year's Circuit of Britain, which is down to take place between August 1st and 15th. Although, as I have already said, he only arrived on Saturday last, on Sunday he was flying at Brooklands. Place Hawker anywhere where he can get his hands on a machine and you simply can't keep him on the ground!

"ÆOLUS."

THE NETHERAVON DISASTER LAST MARCH.

A *communiqué* has been received from the War Office giving the result of the enquiry by the Advisory Committee for Aeronautics into the cause of the accident to aeroplane No. 204, which resulted in the deaths of Captain Allen and Lieutenant Burroughs of the Royal Flying Corps (Military Wing) on March 11th last at Netheravon. The following is a copy of the Committee's report, dated May 20th :—

"The Committee have had under consideration your letter of April 3rd, asking them to enquire into the cause of fracture of the rudder post of aeroplane No. 204. The fractured post has been carefully examined at the National Physical Laboratory, and the material of the post has been submitted to mechanical tests and to microscopic examination.

"The Committee have instructed me to reply as follows on the specific points referred to in your letter :—

"1. *Sufficiency of the original strength of the tube as designed.*—The maximum stress on the rudder post under the most severe conditions which, in the opinion of the Committee, could occur during flight, has been estimated, and the unwelded tube was found to be capable of bearing not less than three times this stress. The maximum stress thus estimated only falls on the rudder under exceptional conditions, and this figure implies, therefore, a much higher value than 3 for the factor of safety, as the term is at present ordinarily used in aeronautics.

"The Committee are of opinion that the tube, unless it were damaged by the method of attaching it to the rudder, was sufficiently strong.

"2. *Effect of filing.*—The Committee are of opinion that the effect of filing was negligible.

"3. *Effect of welding.*—The evidence afforded by the report showed that the tensile strength of the tube was considerably reduced by the welding process, but this reduction alone was insufficient to account for the accident. It is well known, however, that heating steel, even for a short time, to the temperature required for autogenous welding, in addition to seriously diminishing its strength and ductility, also reduces its power to resist alternating stress or shock.

"4. *Effect of possible bending and straightening, or vibration.*—Examination of the sound portions of the tube did not furnish evidence of an effect due to possible bending and straightening. Such effect would, however, be most likely to occur at the weakest part of the tube, and might be masked by the fracture. There was some slight corrugation on the compression side of the tube which might have existed prior to the fracture, indicating that bending had taken place or might have been caused at the time of the accident.

"Vibration of the rudder, if set up by some cause producing impulses synchronous with the natural oscillations of the rudder, might give rise to stresses of considerable magnitude. No evidence was before the Committee that this had occurred, but the necessary conditions might arise if the engine were run while the machine was on the ground.

"5. *Effect of absence of wood filling.*—The margin of safety referred to under (1) was calculated on the strength of the tube alone, without wood filling. The factor of safety would not be raised to any considerable extent by the presence of the wood filling.

"*General conclusions.*—So far as it is possible to judge from the available evidence, the stresses to which the rudder post was subject at the time of the accident were well within the margin of safety of the design, and the Committee are forced to the opinion that some flaw existed before the machine left the ground. It does not follow, however, that such flaw could have been detected by external examination.

"The fracture took place across a section where the bending stresses were not far from a maximum, and where, owing to the fact that the steel had been raised to the temperature required for autogenous welding, and thus "overheated," the tube was weakest. The machine during its life, though not at the time of the accident, had been subject to severe stresses, and it is possible that the action of these had been sufficient to set up a flaw in the region of the tube, which had been "overheated" by the welding, and that this flaw had gradually developed so as to lead to the breakdown. Or again, it is possible that the rudder post had been slightly bent by accident or by rough usage, and that the flaw had been started thus, or as a result of subsequent straightening; though, from experiments which have been conducted, it seems unlikely that the flaw can have originated in this manner. If, however, this were the case, the bending must, as would be expected, have been confined to the neighbourhood of the fracture where the tube was weakened by the welding. The microscopic examination did not show signs of such ill-treatment, but near the fracture these may have been masked by the break itself.

"There is no reason to suppose that the slight filing noted, or the absence of the wood filling, contributed to any appreciable extent to the disaster, while, apart from its condition at the weld, the material of the post was good and amply strong enough for the stresses it had to bear in use.

"R. T. GLAZEBROOK, Chairman."

ROYAL FLYING CORPS (MILITARY WING).

WAR OFFICE summary of work for week ending June 6th, 1914 :—

Concentration Camp.—Headquarters, Headquarter Flight, Aircraft Park, Nos. 2, 3, 4, 5 and 6 Squadrons.—Work in camp opened on June 2nd. The commanding officer held a conference of all officers; he explained briefly the objects of the camp, viz., to test in various ways the degree of training of personnel both on the ground and in the air, the work and handling of aircraft and transport, and experiments of numerous sorts; also the study and co-ordination, by means of lectures, discussions, conferences, and specially detailed committees, of the innumerable problems such as mobilisation, technical and military training, observation, workshops, stores, meteorology, wireless telegraphy, photography, bomb dropping, and organisation of all sorts, which are essential to the rapid building up on an efficient basis of a flying corps. The work indicated was at once started on these lines and continued throughout the week. Interesting speed, climbing and other tests were effected. In the evenings inter-squadron competitions, cricket, football, cross-country running, boxing, sports, &c., are carried out. There is much keenness amongst the squadrons to win the challenge cups and prizes presented for these events. Nos. 1 and 7 Squadrons and the Recruit Depôt remain at Farnborough. The officers come to the camp as required to assist in various matters and to keep in touch with the progress of the work done.

ROYAL FLYING CORPS.

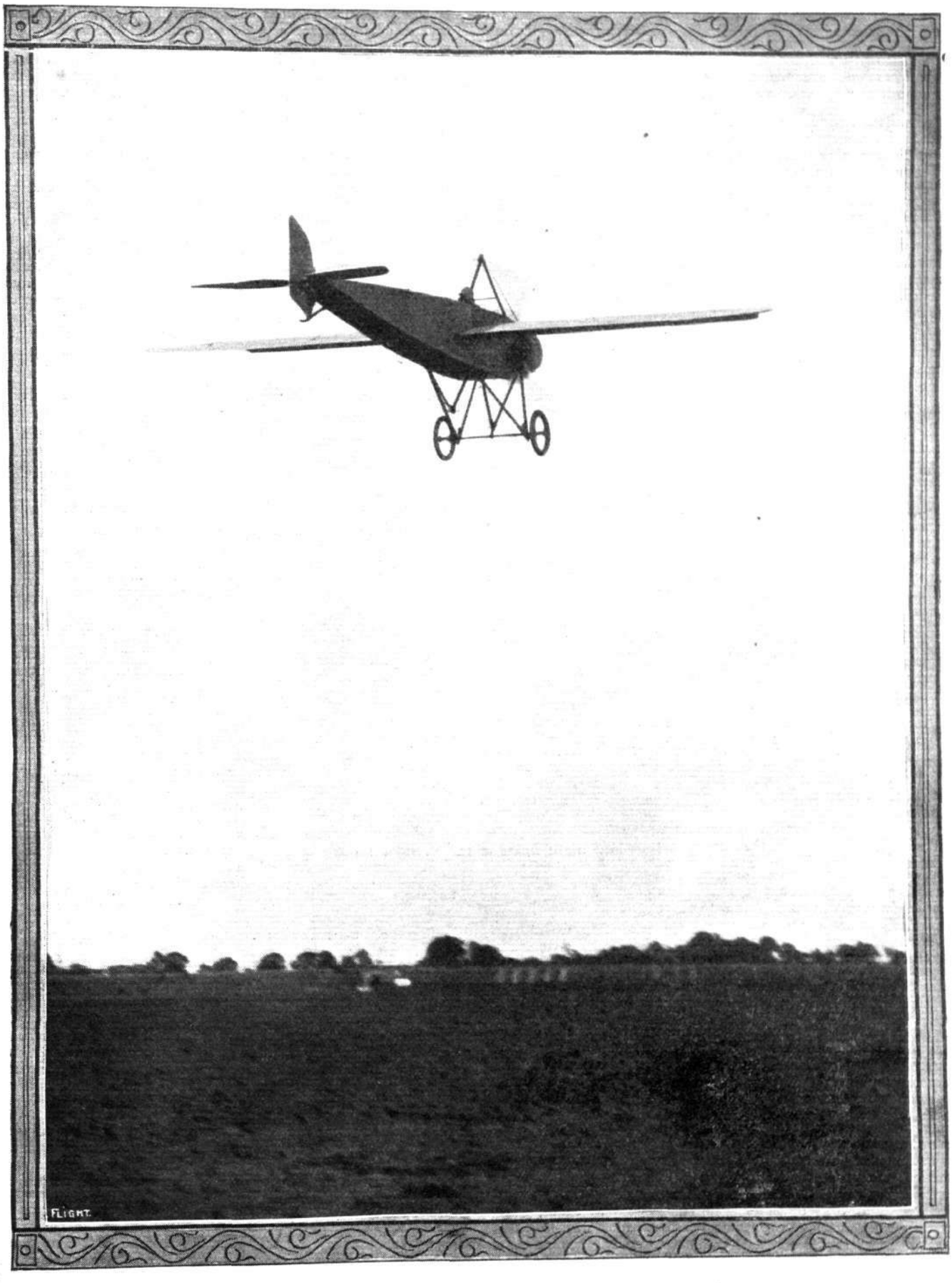
THE following announcements appeared in the *London Gazette* of the 5th inst. :—

R.F.C.—Military Wing.—Lieut. Reginald Cholmondeley, Rifle Brigade (Prince Consort's Own), a Flying Officer, to be advanced to Flight Commander, and to be granted the temporary rank of Capt. whilst so employed; May 1st, 1914. Second Lieut. Denys C. Ware, Special Reserve, to be appointed to the Reserve; April 28th, 1914.

R.F.C. Military Wing.—*Supplementary to Regular Corps.*—Second Lieut. (on probation) Denys C. Ware is confirmed in his rank.

The following appointment was announced by the Admiralty on the 10th inst. :—

H. L. Woodcock, to the "Pembroke," additional, as squadron commander, for command of Farnborough Airship Station and for naval airship No. 4, in command, temporary, to date June 9th.

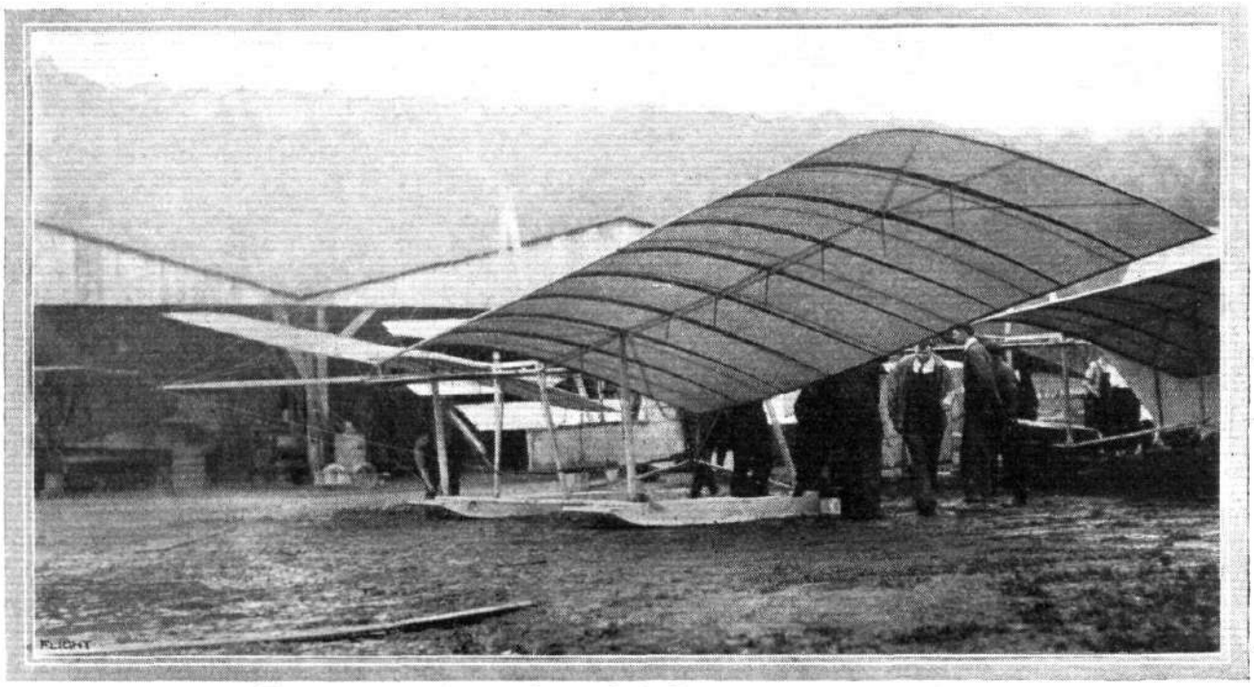


Mr. Frank Goodden flying the Morane-Saulnier at Hendon Aerodrome.

TESTING THE LANGLEY "AERODROME."

As briefly announced in our issue of June 5th, the well-known American aeroplane constructor and aviator, Glenn H. Curtiss, succeeded, on May 28th last, in making a flight on the tandem monoplane built by Dr. S. P. Langley in 1903. Contrary to a common report, this was the original Langley machine, and not a copy, as, although originally refused by the Smithsonian Institution, they subsequently agreed to let the original structure be used. Some of the ribs, which had been broken, were replaced and the wings resurfaced, but the original engine and propellers were used, as well as all of the framework and most of the original cross-wiring. During the first test, the object of which was to determine if the balance of the machine had been adversely affected by the added weight and head resistance of the floats and other fittings, Mr. Curtiss was taxying along the surface of the water at a moderate speed when the machine quietly lifted into the air and sailed steadily along for some distance.

This performance is all the more remarkable in view of the fact that the machine lifted not only the load which Dr. Langley had designed it to carry, but in addition lifted an extra weight of 340 lbs., in the form of floats and other fittings attached to the machine in order to facilitate launching it from the water. In previous trials, eleven years ago, the "Aerodrome," as Dr. Langley called his machine, was launched from a catapult on top of a house-boat, and wrecked through the failure of this launching apparatus.



Front wings and main floats of the Langley tandem monoplane.

Among those who witnessed the tests were Dr. Charles D. Walcott, Secretary of the Smithsonian Institution, and Dr. A. F. Zahm, Recorder of the Langley Aerodynamical Laboratory, and a number of well-known aviators. In a statement for the press, Dr. Walcott said: "I was well pleased with the launching this morning. Although the machine and pilot weighed 340 pounds more than the machine and pilot of 1903, it rose gracefully from the water on the very first trial, and maintained remarkable stability both in the air and on the water. I assigned to Mr. Curtiss the task of rehabilitating the original machine and of testing it over the water, first, for the purpose of vindicating Dr. Langley's design, and, secondly, to ascertain the practical value of his design in the present state of aviation. It is my hope that succeeding trials will amply justify the good opinion which aeronautical engineers, both here and in Europe, have long entertained of Dr. Langley's design."

Below we publish the abbreviated history of Dr. Langley's study and experiments as communicated to us by Mr. Glenn H. Curtiss:—

"The story of Samuel Pierpont Langley's study and experiments in connection with aeronautics begins in 1887, some years before serious-minded people considered aerial navigation with machines heavier than the air practical, and extends over nearly sixteen years. During that time Mr. Langley established and successfully demonstrated many principles which have since proved invaluable to the science of aviation.

"Mr. Langley's main object was to establish by experiment the possibility of, and the conditions necessary for, transporting a body heavier than the air through that medium. He began with studies of toy aeroplanes propelled with rubber bands, which led to more elaborate experiments with planes, propellers, steam and gas engines, and other accessories, and to his final experiments with a man-carrying machine propelled by a gasoline engine which, although built eleven years ago, is nearly as efficient as those evolved by the engineers of to-day. In his early experiments he met with many discouragements, but his persistency led finally to those results which entitled him to be called 'The First Bird Man.'

"The results of his experiments were printed in popular form in several magazines and periodicals, while his technical scientific reports were issued by the Smithsonian Institution during his term as Secretary from 1887 to 1906. His first real contribution to the science of aeronautics was entitled 'Experiments in Aerodynamics,' published in 1891, which covered his early physical researches in relation to aerodynamics, and showed that the real problems of aviation were those of guiding and elevating a plane rather than of supporting it. Mr. Langley had already established the possibility of the latter by means of his suspended planes, the plane dropper, and other apparatus.

"The second aeronautical treatise of Mr. Langley was on the 'Internal Work of the Wind' published in 1893, in which he pointed out the various internal forces of the atmosphere upon which objects might rely for support apart from their own power.

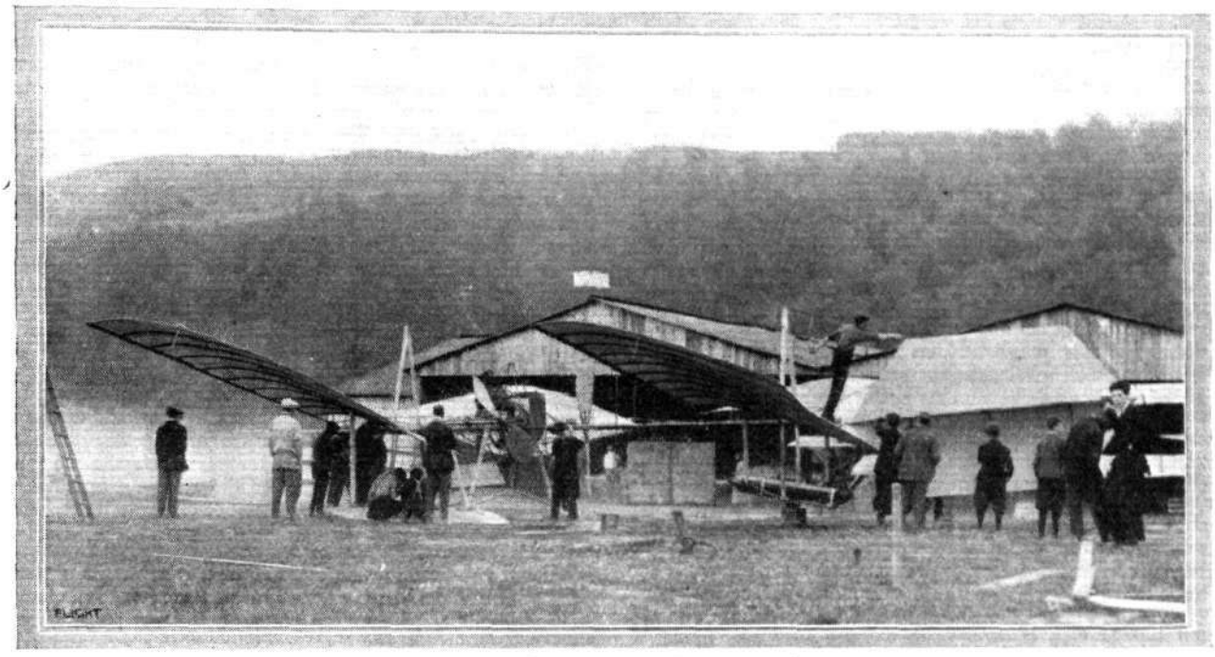
"In 1911, a complete and detailed account of his investigations relative to the models and the large machine was issued under the title of the 'Langley Memoir on Mechanical Flight.'

"Having secured a grasp upon the fundamental principles of air resistances, and matters pertaining to aviation generally, Mr. Langley undertook the construction of the first heavier-than-air model machine in 1892. He felt that it would be impossible to conduct further investigations regarding flight without studying flight itself. The first model aeroplane, or 'aerodrome' as he termed it, was completed after four years of experimentation. It was a steam-driven machine, with two sets of monoplane wings arranged in tandem, and a tiny steam plant which weighed only 7 lbs. complete and yet developed 1¼ h.p. Many boilers, burners, and frames were built and discarded before the aerodrome was finished, and then the problem of launching it confronted him. This was finally accomplished by means of an overhead track from which the machine, when ready to fly, was shot into the air by a series of springs.

"The first successful flight was made on May 6th, 1896, at Quantico, on the Potomac River, by this tandem type plane, which had a wing spread of 13 ft. and a total weight of 30 lbs. The flight occupied 1 min. 20 secs., during which time the little machine covered a distance of 3,000 ft. It was immediately started again, and made a flight of over 2,300 ft. These were the first flights of

a machine heavier than air and propelled by its own power ever made in the history of the world. Subsequent flights of this machine and others with both steam and gasoline power proved their efficiency, and also demonstrated the correctness of Mr. Langley's theory of the practicability of flight.

"Early in 1898, the Government became interested in the possibility of employing large flying machines in time of war, and the President, through the Board of Ordnance and Fortification of the War Department, requested Mr. Langley to build a man-carrying machine. This the inventor undertook, and finally in 1903 he had completed the construction of the full-sized steel machine, despite many handicaps and delays encountered in securing a suitable engine and other accessories.



Side view of Langley tandem monoplane.

"The large engine is a gasoline one, built in the Smithsonian shops under the direction of Mr. Charles M. Manly. It is a five-cylinder engine, developing a little over 52 actual horse-power, and weighing, with radiators, batteries, and 20 lbs. of cooling water, only 207 lbs., a little less than 4 lbs. per horse-power. The complete aerodrome ready for flight weighed about 850 lbs., including the aviator, and had a total supporting area of 1,040 sq. ft., or a total of 1·25 sq. ft. of surface to the pound.

"Before the completion and test of the large machine, however, a quarter-size gasoline model was constructed, and flown with success on August 8th, 1903.

"Two attempted flights with the man-carrying machine were made on October 7th and December 8th, 1903, but owing to an inefficient launching apparatus the aerodrome was not successfully launched into the air, but fell into the water before it got free from the track and launching ways. It was immediately taken out of the water, carefully cleaned, and has since been stored in the Smithsonian Laboratory.

"The War Department did not make an additional allotment for further experiments, and Mr. Langley, owing to lack of funds, never undertook to fly the machine again. During recent years, progress in aviation has brought much to the attention of the world regarding flying machines which Mr. Langley not only knew but could have demonstrated had further support been accorded."

Rear view showing cruciform tail planes and large dihedral angle on main planes of Langley tandem monoplane.

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Mr. Manton at Sheffield.

ON June 2nd, 3rd and 4th, Mr. Marcus D. Manton gave a very fine display of exhibition flying, looping the loop, &c., on his 50 h.p. Blériot, at Sheffield—his native city. Between the flights members of the Sheffield Aero Club demonstrated the capabilities of their model aeroplanes.

THE AEROPLANE IN WAR.

THE tenth of the series of special lectures arranged by the Military Education Committee under the authority of the Senate of the University of London was delivered by Major W. S. Brancker, R.A., entitled "The Aeroplane in War," of which the following is an abstract :—

The lecturer observed that owing to the extensive character of the subject, he would confine his remarks to the aeroplane which most nearly affects our expeditionary force at the moment—the land machine.

The aeroplane was, as yet, untried in war ; as although it had seen active service in Tripoli and in the Balkans, in neither of these countries were the conditions such as to afford much information concerning its possibilities. Hence their value in war and the methods of employment are only matters for conjecture. At the present time, however, armed airships and aeroplanes and weapons of offence and defence against aircraft were in existence, and therefore peace training would only lack the reality of war.

Of the many possible duties which can be performed by aeroplanes in war, the following were the most important :—(1) Reconnaissance. (2) The destruction of hostile aircraft—both airships and aeroplanes. (3) The attack of troops on the ground and of material, such as airship sheds, oil tanks, magazines, &c.

(1) *Reconnaissance.*—Reconnaissance was the principal duty of the aeroplane in war ; it had been possible for the last two years, and would be the most important factor if war broke out to-morrow. In this sphere, the aeroplane had come as an antidote to the growing difficulty of reconnaissance in modern warfare. Sound war plans were easily made if the enemy's forces and probable intentions were known, but the greater accuracy of long range rifle- and gun-fire, increased numbers and more extended formation of troops, and the use of smokeless powder had thickened the fog of war and made it most difficult and dangerous for cavalry to reconnoitre an enemy's position. But, given good conditions, a great deal of information could be gleaned of the enemy's dispositions, particularly during the earlier phases of a campaign, when the troops were in close formations ; and an aeroplane flying at 4,000 ft. should be able to bring in information ten times faster and more definite than that which a division of cavalry might normally obtain after a day's fighting.

There were, however, various adverse factors with which aerial services have to compete, and that tend to prevent any approach to infallibility in the results obtained. Among these were :—

(*a*) Imperfect observation and hostile subterfuges ; (*b*) Climatic conditions ; (*c*) Difficulties of maintenance ; (*d*) Anti-aircraft weapons on the ground ; and (*e*) Fighting in the air.

(*a*) *Imperfect observations.*—The art of accurate observation from an aeroplane is much more difficult, and requires far more training than does the art of flying. Both pilot and observer must be able to read and understand a map just as quickly and as easily as they can a book, and at any instant during a cross-country flight they should know exactly where they were. Beyond this, the observer (or in a single-seater, the pilot) must be able to pick up troops on the ground, estimate what they are, their numbers, and mark their precise position on the map. He may have to do this in a rough wind and in the midst of fleeting clouds ; and on landing, write a clear and intelligible report of what he has seen. It is not therefore surprising that the results of aerial reconnaissance are sometimes inaccurate and misleading, and this weakness will be intensified by subterfuges undertaken by the enemy for the express purpose of deceiving the observer—such as, by stringing out small columns along roads to represent large ones whilst the mass of the troops are kept hidden in woods and villages ; dummy trenches may be constructed while the real trenches are hidden ; guns may be made to look like bivouac shelters, bushes or country carts ; &c.

The best guarantee that aerial reconnaissance will overcome these difficulties lies in the careful training and wide experience of its observers ; and in the possession of sufficient numbers of aeroplanes to enable doubtful information to be checked and corrected without delay. Assistance to full and acourate observation may be obtained by the use of aeroplanes which can fly slowly and have a good field of view ; although these are somewhat handicapped in strong winds.

(*b*) *Climatic conditions.*—Nature is the greatest enemy against reconnaissance at the moment ; her weapons are—wind, rain, cloud and darkness. Wind is gradually being conquered, as aeroplanes, travelling at from 60 to 70 miles per hour, have actually been blown backwards by winds they have encountered. But the great drawback to the wind is the reduced radius of action of the aeroplane. As regards the progress made against the effects of rain, the impact of the drops of rain on the eyes of the pilot blind him ; but in the latest types of machine the seats were screened, so that this difficulty in flying had been largely overcome, and observation is practicable at low altitudes.

High clouds (that is those from 3,000 ft. high and upwards) do not hinder observation, but rather assist it, by affording a sheltering screen to the aeroplane, if necessary ; and at this altitude a pilot is comparatively safe from infantry fire ; but clouds at lower elevations force the observer to come within the effective range of rifle fire from the ground. This can be remedied by the development of the armoured aeroplane. Fog, however, will always presumably defeat aerial reconnaissance, just as it defeats reconnaissance on the ground. Flying in darkness is not much indulged in at present, because engines are not sufficiently reliable to eliminate the possibility of a forced landing ; and a forced landing on an unknown ground usually means a bad smash, but with the really reliable engine night-flying will become universally practised.

Hence to compete with climatic conditions there are two important requirements :—(II) reliable engines and (III) high speed. As regards speed, a machine that is fast in the air is always difficult to land, even though it can land slowly in the hands of a good pilot where the country is open. The antidote for this lies in the use of air brakes for coming down steeply, and of land brakes for pulling up quickly after touching the ground. Experiments in both are proceeding, and successful land brakes actually exist in some machines. High speed has, however, another disadvantage, namely, in still air it is much more difficult to observe accurately than from a comparatively slow aeroplane, and though it may be perfectly easy to see every detail of the country and the troops moving in it, the eye, the brain and the hand are not quick enough to gauge accurately where those troops are on the map, and to record the fact in a note-book before the aeroplane is miles further on and some, perhaps important, detail has been completely missed. Variable speed will get over this difficulty.

(*c*) *Difficulties of maintenance* are sometimes lost sight of. The aeroplane and its engine are both fragile and delicate. A good average pilot may fly, day after day, round an aerodrome and make many landings without even straining his machine ; but in war the pilot must fly in any weather to obtain information, and land on almost any ground to deliver it. The result will be numerous breakages and strains, all of which take time and skill to repair, and which demand the provision of large quantities of spare parts wherever required on the theatre of war. The difficulty of supply of spare parts will be increased in proportion to the number of different types of aeroplanes employed. Similar remarks apply to the engines, which in addition require thorough overhaul after a comparatively short period at work. Portable tents will also have to be carried for housing machines upon the ground to prevent serious deterioration in the flying qualities of the machines. All this points to the fact that only a small proportion of the aeroplanes in the field will be fit to take the air at any given moment.

The cures for this weakness are various, and can all be applied simultaneously. (1) Increased durability in construction. (2) Reduction in the number of types of aeroplanes and engines employed. (3) The introduction of folding aeroplanes which can be more readily housed than the prevailing type. (4) A really experienced personnel.

(*d*) *Anti-aircraft weapons on the ground.*—All nations are endeavouring to evolve anti-aircraft guns, both fixed and mobile ; but at the moment they do not exist for employment with a mobile army in the field, and for reconnaissance purposes an aeroplane is safe at 3,000 ft. from rifle fire and at 4,000 ft. from gun fire. There are great inherent difficulties in firing at aeroplanes, principally in regard to range, speed and direction of the machine ; while it is almost impossible to recognise whether it is friendly or hostile, although attempts were being made to help to differentiate between them.

(*e*) *Fighting in the air.*—It is obvious that if hostile aeroplanes are armed with a weapon which can be used against the purely reconnaissance machine, the information brought in by the latter will, very likely, be greatly depreciated in value and in volume, and may not come in at all ; and that to combat the armed aeroplane it is necessary to pit other armed aircraft against it.

Before leaving the duties of reconnaissance, the lecturer observed that aeroplanes would not entirely relieve the cavalry of this work, for cavalry reconnaissance succeeds where aeroplane reconnaissance fails, as cavalry can distinguish between friends and hostile troops, can discern the morale and physical condition of the enemy ; it can keep in touch with any particular body of the enemy, and can offer opposition to its advance. The leader of the future will employ his aeroplanes and his cavalry so that one supplements the other, and the employment of the aeroplane in the initial stages of a campaign will enable a commander-in-chief to hold his cavalry back and save them much long and fruitless work, thus keeping them fresh for fighting when the main armies begin to close. The aeroplane will also enable the effect of artillery fire to be observed, thereby solving

a difficulty which has been growing more and more acute during recent times; while intercommunication between widely separated forces will also be readily possible with any aeroplane suitable for reconnaissance.

All that has been claimed so far has been actually accomplished in peace and could be accomplished in war, while the suggested improvements and developments are practical possibilities, and are actually under experiment at the present moment.

2. *The destruction of the enemy's aircraft.*—It has already been proved possible in this country to fire a rifle, a machine gun, and even a 1-pounder gun from an aeroplane with fair accuracy, and it therefore seems logical that if two rival forces are equipped with aircraft, these aircraft must fight in order to maintain for themselves the advantage of being able to reconnoitre. The aeroplane of the immediate future will be armed, but the additional weight and strength involved entails loss both of speed and climbing power; so that, at the present, the armed aeroplane must be somewhat inferior in performance to an unharmed one, other things being equal. From an offensive point of view, an aeroplane may attack hostile (*a*) airships, (*b*) aeroplanes, and (*c*) aircraft on the ground. The average aeroplane is faster than the average airship, and therefore fighting is sure to occur so long as aeroplane pilots are determined to attack the airship. The aeroplane can fly faster, climb higher, and is easier to manœuvre than the airship, while the latter can climb faster and provides a steadier platform for a heavier armament than the former. It seems probable that airships will try to keep aeroplanes at a distance by virtue of their power to deliver more accurate fire, while the aeroplane will endeavour to close in order to make use of their manœuvring power and to obviate the comparative inaccuracy of their fire. It may prove necessary to employ three or four aeroplanes, armed with machine guns, light guns, or bombs, for the attack of one airship. There is also the possibility of the fast aeroplane catching and ramming or driving through the airship. This would be desperate work, but the destruction of two or three airships in this way would have a very great moral effect on the remainder. The combat between two aeroplanes is more difficult to imagine. If each was determined to destroy the other, the pilots presumably would manœuvre so as to prevent the opponent using his weapon to the best advantage, whilst he gave his own companion the free use of his. If one aeroplane tries to avoid the other, then speed would be the determining factor as to whether they come to grips or not; but the pilot who decides to flee will, in doing so, present the best possible target to the pursuer. As has been stated, other things being equal, an armed aeroplane will always be less efficient in speed and climbing power than a similar machine not intended for the carriage of weapons, and therefore it will be difficult for the former to catch the latter, so it may be necessary to allot a definite area to an armed aeroplane, over which it would cruise and drive away any hostile scout that came into its zone. With such a scheme, encounters would be fairly frequent and it may prove necessary to obtain command of the air before aerial reconnaissance is resorted to.

Aeroplanes and airships on the ground and their shelters can be seen from a great distance, and offer a very fair and defenceless target for attack; and the sudden attack of three or four aeroplanes provided with bombs and flying low might cause great damage to both, against which anti-aircraft guns would probably have to be employed.

3. *The attack of troops, ships and important buildings.*—At present it is unlikely that many aeroplanes can be used for the attack of troops on the ground. Until fighting in the air had come to an end, and until all necessary reconnaissance had been completed, it would hardly be sound to devote much energy to such an object, while the damage done would probably be too small to justify the risk of venturing within decisive rifle range. On the other hand, at the end of a hard fought action, *if* any armed aeroplanes were still available, which is doubtful, they would certainly assist in completing the demoralisation of a beaten army. The attack of big guns, magazines and oil tanks will, however, be a part of an aeroplane's duties in the attack of a fortress.

It is impossible to include all the desirable qualities in one type of aeroplane and, at present, it is desired to confine the requirements of the Army to five types, which are as follow:—

(I) The high speed single-seater scout of exceptional climbing powers for long range reconnaissance in any wind, and of such an efficiency as to be able to escape from any type of fighting machine which it may be possible to produce at present.

(II) A speedy two-seater reconnaissance machine suitable for deliberate long range reconnaissance and capable of carrying an observer and a wireless installation. Such a type could also be used for bomb dropping.

(III) A two-seater reconnaissance aeroplane having an exceptionally good field of view and the ability to land anywhere—which will be especially suited for short range reconnaissance during the actual battle and for observation of artillery fire.

(IV and V) Finally, two fighting machines, one to carry a machine gun and the other a light gun, firing shell—both of them tentative, but both well within the range of possibility at the present moment.

The ideal would be to standardise in each of these types; but even this is impossible as every really promising design must be given a trial, and every promising constructor must be given work.

It seems that the use of the aeroplane for reconnaissance cannot fail to hasten the progress of operations, at all events between two determined opponents who understand the value of the offensive. Fighting in the air will probably demand a higher standard of morale throughout those engaged in it than any other feature in war; and an aerial service which is lacking in this respect will speedily vanish from the air in the face of opponents who have it.

Turning to what has been done in our own country, the quality of our machines is good, but the numbers are small. The disadvantage that we have laboured under is our very small military strength as compared with that of our neighbours. It must be remembered that so far, the development of aeroplane manufacture has depended directly upon the strength of the Army, so that whilst Germany and France have been providing for field armies totalling about a million men apiece, we have been catering for our expeditionary force of about 160,000 men; while the large peace strength of these two countries renders the problem of the provision of *personnel*, land and barracks far easier with them than for us. When our Territorial army, coast defences, and our Navy attains an aerial strength fitting to the size of our Fleet we shall be in a better position. Meanwhile we possess very good pilots; our designers have produced aeroplanes which in certain respects cannot be beaten anywhere; and we hope soon to rival any other nation in the production of engines.

The aeroplane has depended almost entirely on its warlike capabilities for its development, and all those who object to a large expenditure on so warlike a service should remember that every penny which is put into military aviation is not only providing an insurance against war, but is developing the luxurious flying machine of the future.

The geographical position of any nation will no longer offer the same advantages, or disadvantages, as it does to-day. From now onwards, the struggle for aerial supremacy, be it commercial or military, will go on irresistibly; new developments are following one another in hot haste, and a great nation like our own will only be able to keep her place in the race, by the unflinching expenditure of money and sacrifice of life.

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MR. B. C. HUCKS' ACTIVITIES.

ON May 20th and 21st Mr. B.C. Hucks was the chief attraction of the Devon County Agricultural Show at Totnes, where he looped the loop and carried numerous passengers. On the second day there was a crowd of 16,000, a record for the show. On May 22nd and 23rd Mr. Hucks demonstrated at Wells, Somerset, which necessitated very smart work in conveying the two machines over night between the two points. The following week on May 28th Mr. Hucks flew at Ludford Park, Ludlow, before a huge crowd, which included the Mayor. On the following day at Stafford Mr. Hucks broke his own looping record by accomplishing thirteen consecutive loops. Whilst at Stafford Mr. Hucks on the Saturday was entertained by Col. and Mrs. Congreve at Chartley Castle. He gave another demonstration on the following day and carried five passengers. On Whit-Monday and Tuesday Birmingham was visited, the feature of the afternoon being a sweepstake for passenger flights, which created considerable interest. On the following Wednesday, Thursday and Friday looping flights were given at Nottingham under ideal conditions, but from a very awkward landing ground, which called for great skill when manœuvring on the ground. Mr. Hucks should also have flown at Nottingham on the Saturday, but as he had been engaged to loop the loop at Ranelagh, Mr. Manton, his under-study, flew in his stead in a 40-mile wind, creating much enthusiasm. At Ranelagh last Saturday Mr. Hucks made an attempt on the upside down flying record, but owing to fog and a tricky wind he was only able to remain upside down 1 min. 25 secs. At Nottingham on the first day of the meeting Mr. Hucks flew upside down for three miles, and one of his passengers was Sir J. T. McCraith. On Wednesday and Thursday of this week Mr. Hucks was at Waltham Abbey in connection with the Essex Agricultural Society's Show. This is a prohibited area, but Mr. Hucks obtained special exemption from the Home Office and the War Office.

THE FLYING MACHINE FROM AN ENGINEERING STANDPOINT.

By FREDERICK WILLIAM LANCHESTER, M.Inst.C.E.

(*Continued from page* 608.)

6. *Propulsion.*—We are now in a position to consider the question of propulsion. Whether we appeal to experience or theory it would appear that there is only one method of propulsion available, namely, the screw-propeller.* The problem of propulsion, whether aeronautical or submarine, is essentially the same; the laws of dynamic similarity with certain reservations are strictly applicable. Roughly speaking the conditions of usage of propellers in water and air may be compared by merely taking cognizance of the relative densities of the two media—approximately 800 to 1. The laws of dynamic similarity indicate that this relation is not exact, but any refinement of theory on this score is of academic rather than of practical importance. Apart from fine points of this kind there is a limitation that renders the air-propeller and the marine-propeller not strictly comparable; this limitation is due to the appearance of the phenomenon known to the naval engineer as cavitation. The law of the relation of pressure to velocity for least resistance applies to the blade of the screw-propeller precisely as it does to the aerofoil itself, so that if a propeller is being designed for least resistance the pressure per square foot at any point of the blade must bear its constant relation to the square of the velocity of the blade through the fluid at that point. In the case of the marine-propeller this results in a speed being reached (at about 20 or 25 knots speed of vessel) at which the velocity of the blade tips is such that the negative pressure (on the back of the blade), based on the law of least resistance, is greater than the hydrostatic (absolute) pressure. Under these conditions a vacuum is formed in the vicinity of the blade extremity, and the system of flow is impaired; this is the condition of incipient cavitation, and as the speed is progressively increased the vacuum invades more and more of the blade area until the greater part of the propeller becomes ineffective. From the critical speed upwards the design of the marine-propeller becomes a compromise. The extremity of the blade is first designed broader to avoid developing pressures sufficient to initiate cavitation, and then, owing to the additional skin friction thereby involved, it is found desirable to adopt higher pitch/diameter ratio to prevent the extremities cutting the water with excessive velocity. Eventually the propeller for high-speed craft becomes one of extremely coarse pitch with blades of short or saucer-like form. No such thing as cavitation is experienced in the aeronautical propeller; if we should require to deal with propeller-blade speeds approaching the velocity of sound we might find something analogous, due to the high rarefaction of air, but at present the aeronautical designer can afford to ignore all question of cavitation.

It is frequently stated that the theory of the screw-propeller is entirely empirical and quite unsatisfactory; this is not my opinion. The theory of the screw-propeller based on the theory of the aerofoil as laid down in my *Aerodynamics* (see *Aerial Flight*, vol. i, ch. ix), appears to fully meet the requirements of the aeronautical designer. According to this theory the propeller blade is treated as an aerofoil, its P/V^2 ratio at every point of the blade is fixed by the same law as that of the aerofoil as given; following this the gliding angle of the propeller blade is constant from root to tip.

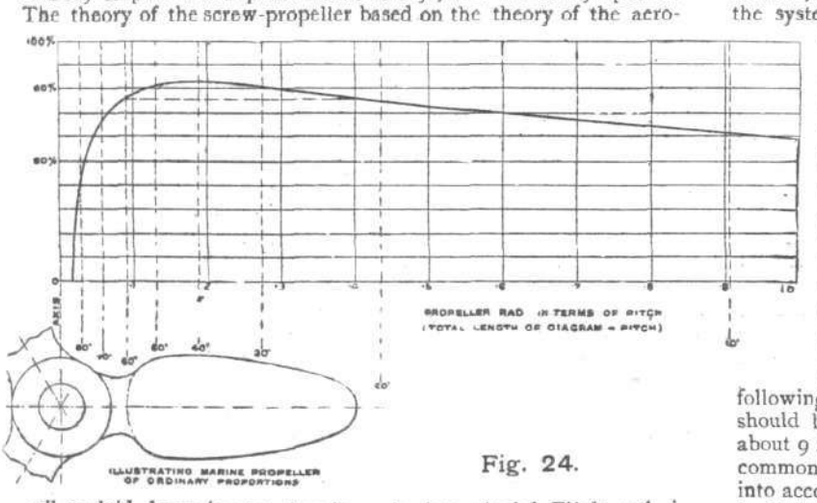

Fig. 24.

*Nature's method of propulsion—wing-flapping—besides being very objectionable from a mechanical point of view, shows certainly no higher degree of mechanical efficiency than the screw-propeller (*Engineering*, February 26th, 1909).

The section of the blade is at every point designed as an aerofoil in which the true helical surface corresponds to the horizontal plane in flight.† Under these circumstances it is shown in my work that each point of the propeller blade has efficiency proper to itself and is represented by a curve as plotted in Fig. 24, which corresponds to a gliding angle of 6°, or, approximately, 10 per cent. Under these conditions it will be seen that in the region of maximum efficiency is just over 81 per cent. Unfortunately we cannot use only the region of maximum efficiency; we have to employ the blade of considerable length, and consequently parts of the blade have an efficiency below the maximum. If we take a propeller of the usual proportions in which the pitch is about 1¼ times the diameter, that is such a blade as represented in Fig. 24, we see that the marine engineer declines to employ any portion of the blade with an efficiency of less than about 92 per cent. of the maximum, that is to say, the efficiency at different points of the blade varies from 77·5 to 81 per cent., or theoretically the limit of efficiency of such a propeller should be round about 77 per cent. Unfortunately, a propeller "in being" cannot consist of blades alone, it requires a boss and a connection between the boss and the blades, and in driving these functionally useless parts through the water a considerable further loss is inevitable. Probably it is for this reason that the actual efficiency of a marine propeller rarely exceeds 70 per cent. In my work a design is given of an aerial-propeller based on theory alone, in which a very conservative estimate is taken of the gliding angle. If in the light of present knowledge we assume the propeller blades being of the aspect ratio corresponding to that of my 1894 gliding model, the gliding angle or resistance coefficient will be about 5 or 6 per cent., and we might anticipate a theoretical limit to the propeller efficiency of 88 or 90 per cent. We have here, as in the marine propeller, to provide a boss and arms, and we require to take into account the fact that it never pays in practice to take the full diameter of the propeller that theory would indicate (it is better to sacrifice a few per cent. efficiency to save weight and clearance diameter). Everything considered, I am disposed to put a limit of efficiency of an aeronautical propeller at about 85 per cent.; this is higher than has been found possible in marine engineering.

My method of propeller design has been adopted and employed for some years by the Superintendent and staff of the R.A.F. with very satisfactory results; at present there is but little available information on the question of efficiency owing to the fact that the arrangements at the disposal of the R.A.F. do not permit of the testing of full-sized propellers.

Working drawings of a propeller, designed at the R.A.F. by this method, are given in Figs. 25 and 26. For the full exposition of the system of "lay out," reference should be made to the work already referred to.

As an alternative and purely empirical basis of treatment, we may fall back on our experience in marine propulsion. There is a practical rule which appears to be commonly adhered to in the design of successful marine propellers for moderate speed sea-going craft. The area of the propeller disk is approximately 1 per cent. of the total wetted surface. This rule has been found by me to represent a rough average of the practice in various cases, but whether it is an accepted rule or not I do not know. Let us take the case of a flying machine involving, say, a thrust of 200 lbs. at 80 ft. per sec.; at this speed the frictional air-resistance will be approximately 0·035 lb. per sq. ft. of surface (0·07 lb. per sq. ft. of lamina, *i.e.*, double surface); thus the resistance of the machine is approximately represented by 6,000 sq. ft. "wetted" surface, and, following the rule given in the case of water, the propeller disk should be 60 sq. ft.; this corresponds to a propeller diameter of about 9 ft. In an actual machine of about this size the propeller is commonly of about 7 ft. to 8 ft. diameter, which, taking everything into account, is in substantial agreement. The propeller employed in flight is of necessity (from considerations of the engine revolution speed) of finer pitch than that of best efficiency. Under these conditions theory shows that the correct diameter is less than that of the propeller of best diameter pitch ratio, such as employed by the naval architect.

† There is one factor which affects the analogy between the aerofoil and the propeller blade; the latter is not able to the same extent to hold or accumulate a *dead-water* wake, the propeller blade sheds its dead water continuously by centrifugal force. The extent to which this affects the problem has yet to be determined.

There are (in the present state of the art) two prominent reasons for the adoption of a propeller for aeronautical machines of finer pitch than that of greatest efficiency; firstly there is the question of suiting the pitch of the propeller to the running speed of the engine. For the power necessary in a modern aeroplane (from 50 to 100 h.p.) a stroke of about 5 ins. is found to design well in

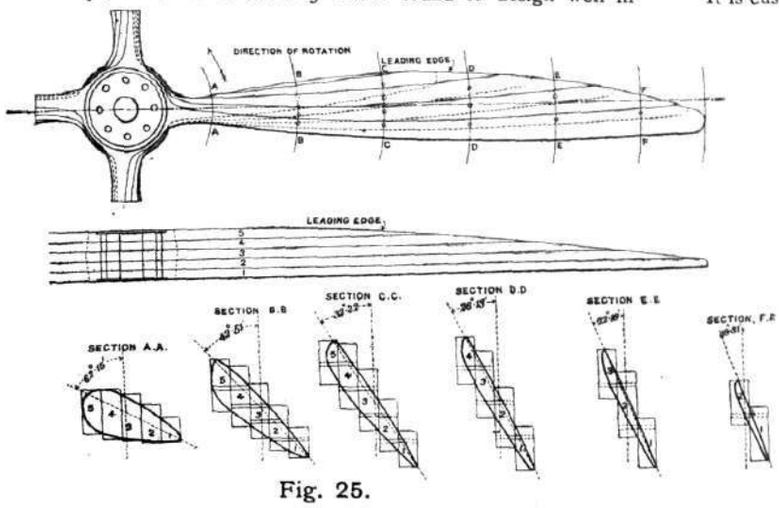

Fig. 25.

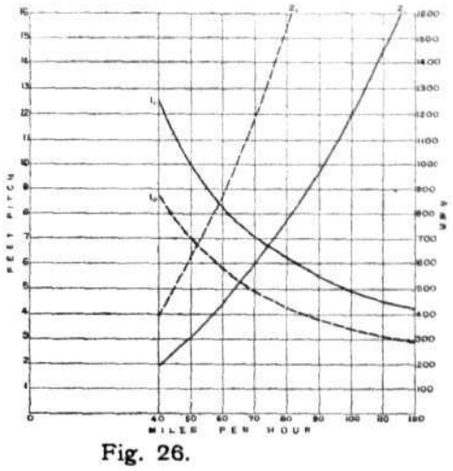

Fig. 26.

proportioning the engine; now it is uneconomical both from the point of view of weight-saving, and of petrol-consumption to employ too low a piston speed; in fact, for any given dimensions of cylinder the power developed is within limits roughly proportional to the piston-speed. Taking a piston-speed of 1,000 ft. per minute and 5-in. stroke, we require 1,200 revolutions per minute = 20 revolutions per second. Assuming a velocity of flight of about 80 ft. per second the effective pitch of the screw requires to be 4 ft., or approximately equal to half the diameter of the screw, instead of at least equal to the diameter, as in a good marine propeller.

It is of course not difficult to gear down from the engine to the propeller, in fact this has been frequently done, but, since gearing involves a tax of approximately 5 per cent. of the horse-power, it is evidently better to drive direct and sacrifice something in the efficiency of the propeller, more especially as this course involves a far lower orque on the propeller shaft, and consequently a lower recoil torque on the framework of the machine.

7. *Motive Power Installation.*—We are now faced with the consideration of the motive-power installation. At the present time, the internal-combustion engine—more definitely the petrol-motor—holds the field. No other prime mover is able to compete either on the score of weight per horse-power or fuel weight economy; there is nothing in sight likely to oust the internal-combustion motor from its supreme position.

The relative importance of lightness and economy of fuel is determined by the class of service for which the motor is required. In Fig. 27 curves are given of weight/horse-power for various motors; ordinates represent weight of motor plus fuel, abscissæ the duration of the run at full load. It can be seen at a glance from this diagram that for brief periods the weight per horse-power of the engine is the all-important factor, whereas for long runs this becomes relatively less important, the weight of petrol and lubricating oil becoming the main item. On referring to Fig. 27 it will be noted, taking the extremes, that the Gnome engine starts with a very considerable advance over the motor-car engine given for comparison, but after a run of seventeen hours of full load, the motor-car engine (represented for the purpose of illustration by the Daimler) by its greater economy has taken the lead. This diagram was prepared by me, some three or four years ago (see Report of the Advisory Committee for 1909–10). Many of the aeronautical motors of the present day combine with a weight/horse-power factor of about 4, a degree of economy that compares well with the best automobile practice.

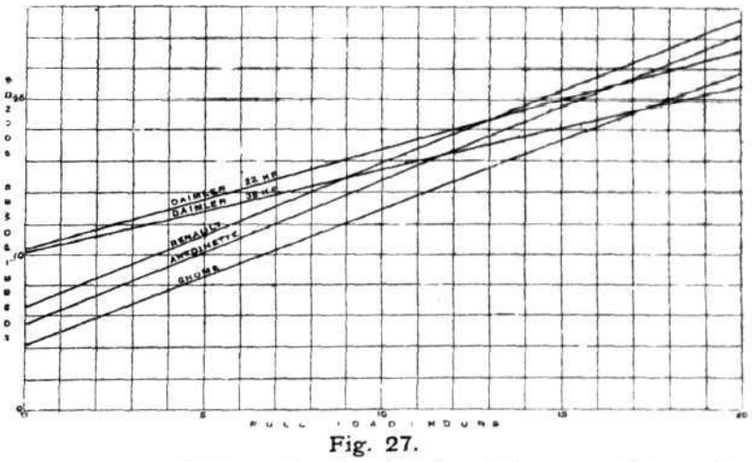

Fig. 27.

Out of a great multiplicity of types of aeronautical engine now on the market there are two types—namely, the rotating engine on the one hand and the light-weight multi-cylinder Vee-type on the other—which I consider likely to survive. The rotating type of engine gives the possibility of very complete balance with simplicity of working parts, and so provides the aeronautical constructor with an engine especially serviceable where small machines are concerned, and simplicity and upkeep are of importance. The rotating engine is, at the present day, reasonably economical in petrol, but is grossly extravagant in lubricating oil, and consequently is at a disadvantage for long-distance work; it will, however, probably hold its own for some time to come in machines for short-distance flying. The rotating engine also suffers from some disadvantages on the score of exhaust silencing. The multi-cylinder Vee-type, though ordinarily not so light, power for power, as the rotating engine, has many advantages, especially, for high power and where long distances have to be negotiated.

It is customary in the rotating engine to employ direct air-cooling; it is, in fact, difficult to arrange such an engine with water-cooling. The horse-power absorbed in the Gnome engine *incidental to* air-cooling is very great; in the original so-called 50 h.p. Gnome (which actually gives very little over 40 h.p. in flight), the power consumed in wind-resistance, even on the test stand, amounts to something nearly 6 h.p., and it may be materially greater under flying conditions.

In engines of the Vee-type water-cooling is in greater favour; the Renault special aeronautical motor is an exception, being cooled by airblast generated by a centrifugal fan. The weight of the water-cooling system when fitted amounts at the best to 0·6 lb. per horse-power (with water nearly 1 lb. per horse-power), and thus constitutes a serious addition to the weight of the installation. Here again the class of service becomes important. It is evident that for short-distance flying, where engine weight is of paramount importance, it may be better to employ direct air-cooling; when, however, a long-distance service is required, it may arise that the weight of the water-cooling system is justified.

According to a recent investigation by me (see Report of the Advisory Committee, 1912-1913, p. 94), the minimum horse-power expended in cooling is a function of the area and temperature difference of the surface exposed, and there is some difficulty in providing an air-cooled engine cylinder with sufficient gill surface to keep the horse-power loss as low as desirable; when, on the other hand, water is used as a heat carrier, the rigid limitation as to available surface no longer applies, there is some disadvantage, however, as to temperature difference. In Fig. 28 a diagram is given showing the essential relations between horse-power equivalent of heat dissipated per square foot surface (abscissæ), tangential velocity of air (ordinates), temperature difference, and power absorbed in skin friction. It will be understood the graphs represent the minimum horse-power absorbed based on the assumption that the air is traversing the surface along a stream-line path, and that there is no additional loss of power in eddy making.

(To be continued.)

FOREIGN AIRCRAFT NEWS.

Gilbert Flies Round France in Two Days.

A REMARKABLE record flight for the Michelin Cup was made by Gilbert on Morane-Saulnier monoplane fitted with 80 h.p. Rhone motor and Chauvière propeller on Monday and Tuesday last. Starting from Villacoublay at 3.1 a.m. he flew *via* Peronne, Rheims, St. Dizier, Gray, Joigny, Beaune, Vienne and Nimes, and eventually landed on Monday night at Mirande on the way to Pau, owing to his petrol supply giving out. On Tuesday, he flew *via* Pau, St. André de Cubzac, Romorantin, Angers, Evreux and Calais back to Villacoublay, where he landed at 6.37 p.m., having covered a total distance of very nearly 3,000 kiloms. in 39½ hrs.

World's Records by Renaux.

ON a 100 h.p. M. Farman, Eugene Renaux, accompanied by his mechanic, at Etampes on Tuesday made new world's speed records for pilot and one passenger from 250 to 500 kiloms. The new records are:—250 kiloms., 2 h. 21 m. 56 s.; 300 kiloms., 2 h. 50 m. 28 s.; 350 kiloms., 3 h. 18 m. 44 s.; 400 kiloms., 3 h. 47 m. 17 s.; 450 kiloms., 4 h. 15 m. 29 s.; 500 kiloms., 4 h. 43 m. 16 s. The records from 250 to 400 kiloms. formerly were held by Guillaux, and the others are newly established.

A Belgian Height Record.

ON a Blériot-Gnome machine, Capt. Deschamp with Lieut. Noermann improved the Belgian altitude record for pilot and passenger by climbing to a height of 2,400 metres on the 3rd inst.

Etampes–Orleans with Two Passengers.

ACCOMPANIED by Lieuts. Lugrin and Montalvan, Gouguenheim on the 6th inst. flew on his 80 h.p. Gnome-H. Farman from Etampes to Orleans, and after a landing at Groves the party returned to Etampes.

Double Fatality in France.

AN escadrille of five monoplanes started from the military centre at Longvic-Ouges on the 5th inst. to fly to Mailly Camp, but owing to the wind four of the machines returned to the starting point. The fifth, piloted by Lieut. Gironne, with Private Riou as passenger, continued on its course, but when flying above the Lamarzelle Forest it suddenly dived to the ground, and both pilot and passenger were killed.

Testing a Stabiliser.

ON the 7th inst., Lieut. Remy, with Private Lorgnat as passenger, made a flight from Etampes to Fontainebleau on a machine fitted with the Lorgnat Stabiliser.

Testing Deps. for French Army.

AT Rheims, before a military commission, on the 5th inst., Prevost put five 80 h.p. Gnome-Deperdussins for the French Army through their official tests, two of the machines, fitted with *monosoupape* engines, attaining a speed of 120 k.p.h. and climbing 1,000 metres in 10 mins. Subsequently Prevost tested a two-seater machine fitted with 80 h.p. *monosoupape* Gnome, and carrying a quickfiring gun; 1,000 metres were climbed in 6½ mins., while the speed was given as 130 k.p.h.

Three More Blériot Loopers.

AT Buc, on the 2nd inst., Capt. Oswald Watt, the Australian sportsman, Mr. S. Pierce of the U.S.A., and Lieut. T. Gran of Norway, who took part in the Scott Expedition, succeeded in looping the loop on Blériots.

A Busy Day for Gilbert.

WITH Col. Estienne as passenger, Gilbert on the 3rd inst. flew from Vincennes to Sissonne Camp on his Rhone-Morane-Saulnier monoplane. He later took Lieut. Morel over to Rheims and back, and in the evening returned to Villacoublay.

Touring on a Farman.

M. BARBAROUX, who with his wife toured on his Maurice Farman from Buc to Tillieres on Saturday week, returned to Buc on the 3rd inst. with M. Seiniol as passenger.

Savoia Co. Extensions.

IN a reference in our last issue to the Savoia Co., it was stated that it was a branch of the G.A.C. This is not strictly correct, as the Savoia Co. is a company formed to acquire from the General Aviation Contractors, Ltd., the Farman rights, and to manufacture the machines in Italy. The G.A.C. have the major interest in the firm, and Mr. D. Lawrence Santoni is managing director. The progress of the business is indicated by the fact that it has been found necessary to move into a larger factory about 10 miles from Milan. The new works include one shop, which is large enough to erect a dozen machines comfortably at a time.

Aeroplane Tries Conclusions with Sheep.

A FINE flight was made by Corporal Chapier with a passenger from Rheims to Villacoublay and Moulins on the 2nd inst. The next day the two aviators went on to Macon, but in landing the monoplane ran into a flock of sheep. The machine was damaged somewhat but the aviators escaped with only slight injuries.

Armoured Nieuports for French Army.

SOME tests have recently been made with two types of armoured Nieuport monoplanes built for the French Army. In these tests, which were carried out under the supervision of a military commission, the machines had to rise and afterwards alight in a square space of 450 ft., bounded by a hedge 6 ft. high. The results were as follows:—Single-seater Nieuport Scout (80 h.p. Gnome): Useful load, 355 lbs.; speed, 78 miles per hour; height, 1,640 ft. in 3 mins. 30 secs., starting from the ground after a run of 229 ft., alighting and stopping in 196 ft. Nieuport Destroyer with Quick-firer: Useful load, 850 lbs.; speed, 89 miles per hour; height, 1,640 ft. in 3 mins. 40 secs., starting from ground after a run of 393 ft., and alighting and stopping in 295 ft.

Italian Pilot Drowned.

WHILE testing a new hydro-aeroplane over Lake Maggiore on the 2nd inst., Cevasco, one of the foremost pilots in Italy, was drowned. The accident was apparently caused through the machine capsizing after an explosion of the motor.

Flying in Morocco, &c.

ON the 4th inst., three of the pilots, Lieuts. Battini and Menard and Sergt. Benoit, belonging to the escadrille of Farman biplanes which set out from Tunis on May 6th, completed the 260 kiloms. stage of their flight from Co'omb-Bechar to Ain-Sefra, after having been held up at Beni-Ounif by the sirocco for 24 hours. The previous evening the two other pilots, Lieut. Cheutin and Sergt. Hurard, rejoined their comrades, by making a non-stop flight from Tendrara to Ain-Sefra, a distance of 350 kiloms. The total distance flown by the escadrille during the month amounted to 2,560 kiloms.

An American Fatality.

WHEN making a steep dive during an exhibition flight at Akron, O., on May 3rd, the left wing of a biplane piloted by H. P. Harris broke. The pilot jumped from the machine when about 40 ft. from the ground, and sustained injuries to which he succumbed as he was being taken to hospital.

Another Aerial Ferry in America.

ON May 15th a regular series of flying boat trips across San Francisco Bay from San Francisco to Oakland, a distance of nearly seven miles, was inaugurated, the first "fare" being Mayor James Rolph. The service is being maintained by Silas Christofferson and Weldon B. Cooke.

High Flying on a Farman in Australia.

A CABLE from Sydney, N.S.W., states that on the 5th inst., Guillaux, on his Farman waterplane, was flying at a height of 3,150 metres.

4½-Hour Trip by the "Conte."

ON the evening of the 3rd inst. the Astra military dirigible "Conte" made a cruise from Belfort, in the direction of Dijon, which lasted 4½ hours.

Night Cruises by Italian Dirigible.

LEAVING her hangar at Boscomantico at 11 p.m. on the 3rd inst., the Italian military dirigible, "P5," carried out a series of manœuvres above Verona, the operations being effected by the aid of powerful searchlights. On the previous Saturday the airship cruised above Verona at a height of 2,000 ft.

Mobilization by Airship.

A MOBILIZATION of the 20th corps of the French Army was effected at Nancy during the night of the 3rd inst., the requisite orders being taken from garrison to garrison by means of the dirigible, "Adjudant Vincenot."

More Wins for Emaillite.

EIGHT of the eleven competing machines, including the first three machines home, in the Aerial Derby on Saturday last, the 6th inst., were doped with British Emaillite. With regard to the winning Morane-Saulnier, flown by Mr. Brock, the Dope combination used was Grades 2, 3 and 4, resulting in a highly glossy and smooth surface. The winning machines of the last three Gordon-Bennett Cups were all doped in this way. After Prevost's remarkable performance in 1913, tests which were carried out at St. Cyr to ascertain the comparative air friction of fabric doped with Emaillite 2, 3 and 4 and a highly polished steel plate gave identical results.

FLIGHT

THE GERMAN "TRIANGLE" RACE.

A THREE days' flying race of somewhat novel form, and one which might advantageously be imitated in this country, took place in Germany during Whitsuntide. The race in question was, as the name implies, flown over a triangular course round the three cities, Berlin, Leipzig, and Dresden. The stage for the first day was: Start from Johannisthal, near Berlin, fly to Dresden *via* Leipzig, where a stop had to be made. No less than 30 machines were waiting on the starting line at the Johannisthal aerodrome on the afternoon of May 30th. The first to get away was Oelerich, who left at 4.9, followed 20 secs. later by Friedrich. In just over half an hour all the competitors, with the exception of Janisch, Hennig and Hanuschke were out of sight. The three last mentioned pilots were somewhat delayed in getting off, but ultimately started an hour later. The names of the starters were: Oelerich, Schüler and Hoefig (D.F.W. biplanes), Friedrich and Linnekogel (Rumpler monoplanes), Stiefvater (Prince Friedrich-Sigismund monoplane), Kahnt and Rosenstein (Gotha monoplanes), Stagge (Pfeil biplane), Boehm, Freindt, Ballod, and Stiploschek (Jeannin Steel Taube), Kühne (Hirth monoplane), Langer (Hirth biplane), Schlüter (Hansa Taube), Schulz (A.F.G. Taube), Boehm and von Loeszl (Albatros biplane), Schumann, Kieszling, and Schweizer (Ago biplanes), Reiterer, Braumüller, and Steffen (Etrich Taube), Rupp (L.V.G. biplane), Janisch (L.V.G. monoplane), Höhndorf (Union-Pfeil biplane), Gasser (Mars biplane), Scherff (Krieger monoplane), Boutard (Beese Taube), Schmidt and Koenig (Court-Torpedo monoplane), Beck (Kondor monoplane), Hennig (Stahlherz biplane), Hanuschke (Hanuschke monoplane).

The first to arrive in Leipzig was Janisch, who covered the 96 miles in 1 hour. After a short rest he started off for Dresden. Thirty of the other competitors arrived with short intervals at Leipzig, most of them continuing their journey after short stops. A few were reported to have had to make forced landings *en route*. Amongst these were Friedrich, Schmidt and Koenig. The second stage, from Leipzig to Dresden, was completed by 15 competitors only, the others having either had to make forced landings, or were prevented by darkness from completing the course. These arrived in Dresden the next morning. First to arrive at Dresden was Schüler, who had covered the distance from Berlin *via* Leipzig in 1 hr. 39 mins. Ballod was second with a flying time of 1 hr. 59 mins., whilst Kühne completed the course in 2 hours.

The second stage of the "triangle" race took place on Whit-Monday. The competitors had to fly from Dresden to Leipzig *via* Berlin, where an intermediate landing had to be made. Thirty-six competitors started in a very strong wind at minute intervals. Several of these had smashes, but no serious accident occurred. Out of the 36 competitors who started from Dresden only 26 arrived at the Johannisthal aerodrome, Berlin, on Whit-Monday. The three first to arrive at Johannisthal were Langer, Koenig and Reiterer. After a short rest the majority of the pilots set out again for Leipzig. On this stage Langer also made the best time, and was the first to arrive in Leipzig, thereby winning the prize of the day for the first arrival. Second was Koenig, followed five minutes later by Reiterer. In all 24 competitors arrived at Leipzig before evening, whilst Steffen did not arrive till the following morning. Kühne had to make a forced landing near Logau, and could not get any further.

On the third day (June 3rd) the stage included start from Leipzig and flying to Berlin *via* Dresden. All the competitors, with the exception of two, succeeding in completing the course on that day. The fastest time between Leipzig and Dresden was made by Schüler on a D.F.W. biplane, who covered the distance of 65 miles in 34 mins. After a short stop at Dresden a start was made for Berlin, where again Schüler was the first to arrive, covering the distance of 105 miles in 1 hr. 15 mins. The best aggregate times on the third day were (1) Schüller, 1 hr. 49 mins.; (2) Schmidt, 2 hrs. 1 min.; (3) Janisch, 2 hrs. 5 mins. The landing of the last named was awaited with anxiety, as at the start from Dresden the right wheel came off his chassis without the pilot noticing it. No great damage was done, however, for the machine simply stood on its head while Janisch himself was quite uninjured. Linnekogel also had a smash, his machine turning over on its back, getting badly damaged, the pilot escaping without a scratch.

After a day's rest at Berlin twenty-seven of the competitors again were off on June 5th on the last stage, which included a complete circuit of the triangular course, starting from and returning to Johannisthal *via* Leipzig and Dresden. All those sent off arrived at the first control—Leipzig—in a very strong wind. The first to alight was Schüler, who covered the distance between Johannisthal and Leipzig in 1 hr. 6 mins. The other competitors got in practically together and were soon on their way to the next control —Dresden.

The number of competitors had been reduced by the time they reached Dresden to twenty-four, of whom twenty-two departed for the run back to Johannisthal. The best aggregate time for the complete course was made by Schüler, whose flying time was 3 hrs. 11 mins.; second was Janisch with a flying time of 3 hrs. 28 mins., and third was Boehm whose time was 3 hrs. 34 mins. In all nineteen competitors completed the course up to 8.30 p.m.

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THE SEAPLANE DISASTER.

IT is with the greatest regret that we have to record the disaster to the Navy seaplane No. 128 near Calshot, on Thursday of last week, by which Lieut. T. S. Creswell and Commander A. Rice lost their lives.

In connection with the accident, an inquest on the body of Lieut. Creswell was held on Saturday at R.N. Hospital, Haslar, by Mr. L. Warner, coroner for S. Hants.

Staff-Surgeon E. D. Rutherford said the body when brought into the hospital was fully clothed, but the clothing was very much torn. There was extensive scalding of the shoulders, back, and both sides. There was a punctured wound on the left thigh, which might have been caused by a sharp piece of metal or wood. The cause of death was drowning, the scalding not being sufficient to cause death.

Lieut.-Commander Longmore, in command of Calshot air station, said that he had flown in the machine on the day of the accident, while Lieut. Creswell had made five short passenger flights previous to starting on the ill-fated one. The conditions for flying were good. Two hours after the accident, with the aid of derricks of the Trinity House steamer, the wreckage was hoisted sufficiently to allow of the removal of deceased's body. He was dead. Nothing was seen of the body of Commander Rice. The wreckage was towed ashore at Calshot. Practically the whole of the machine was there, but was much damaged.

Mr C. Gordon Bell, who was in a motor boat with Lieut. Spenser Grey, R.N., said he saw the seaplane rise, and as it passed over them at a height of 200 ft. or 250 ft., Lieut. Creswall waved his hand to them. The seaplane then went some half to three-quarters of a mile further on, and turned to come back. Witness took his attention off the machine to watch another seaplane, but turned back again to No. 128, and saw it at a height of 100 ft. She was then diving absolutely vertical, nose down. The left wing was beginning to break, starting from the outside bay, and in two seconds the whole frame had broken to pieces, that was a long time before reaching the water—about 60 ft. or so. At the height of 30 ft. witness noticed some black object fall out, and he felt sure it must have been the body of Commander Rice.

Mr. H. W. S. Chilcott said that he saw the machine rise slightly, as if to climb higher, for an instant, and then immediately commence a steady *vol plané*, which rapidly increased in steepness until it became a nose dive. The machine was then dropping towards the water vertically. At this moment, about 150 ft. from the water, approximately, the machine looked to be quite whole, but immediately after the left plane commenced to buckle up and quickly collapsed, but did not become detached from the remainder of the machine.

The inquest was then adjourned to Wednesday last, when Lieut.-Commander Longmore said that, owing to the extremely broken-up state of the wreckage, it was difficult to state when the damage to the seaplane was done. No signs whatever could be found on any part of the machine of either an explosion or a fire. The passenger and pilot seats were practically uninjured. The control wires, which would be in operation for an attempt to counteract the dive, were found to be intact. Of the two compressed-air bottles fitted to the machine for starting the engine one was intact with gauge glass unbroken, and the other was lost. The latter's stowed position was immediately under the pilot's seat, and as this was uninjured it showed that it could not have exploded. The breaking of the left wing was, he thought, due to excessive speed. Why the machine got into a vertical position could not absolutely be ascertained. It was thought that the pilot was counteracting the effect of a light gust, which threw the nose of the machine up slightly, by a downward movement of his elevator, and that before he regained his normal level of flight the speed of the machine had increased to such an extent on its downward glide that the angle quickly increased until the machine was vertically nose down.

They did not come across any fault in construction which would point to the initial cause of the accident.

The jury returned a verdict of accidental death from drowning, and they and the coroner expressed sympathy with the deceased's relatives and comrades.

Up to Wednesday evening the body of Commander Rice had not been recovered.

Models

Edited by V. E. JOHNSON, M.A.

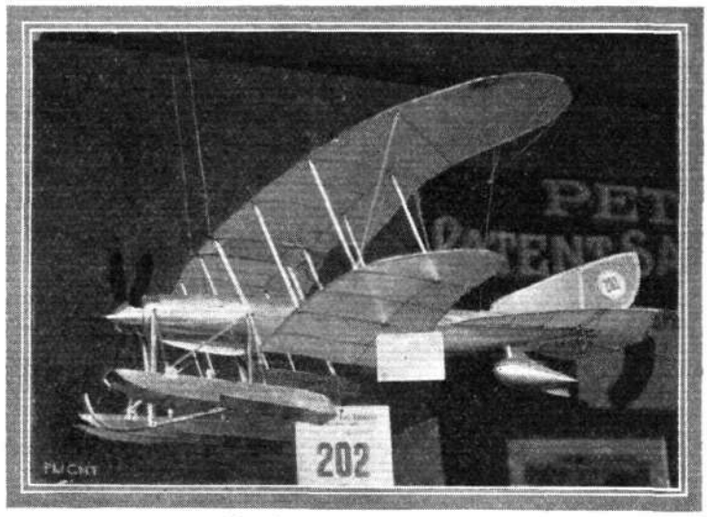
Aero-models at the Bristol International Exhibition.

WE have received from Mr. R. V. Tivy, the Hon. Sec. of the Model Section of the Bristol and West of England Aero Club, some programmes and particulars of their Summer Model Aeroplane Exhibition and Competition to be held at the Bristol International Exhibition, Ashton Avenue, Bristol, subject to arrangements to continue the Bristol Exhibition being concluded. The flying events will be contested on July 18th, the models being on view from the 13th to 18th. Prizes to the value of £17 are to be competed for. There are to be four model flying competitions: (*a*) contest for single-screw machines, prizes £3, £2, and £1; (*b*) for multiple-screw models, prizes £3, £2 and £1—the marks in the above being awarded as follows:—Design, 25 per cent.; construction, 15 per cent.; longitudinal stability, 15 per cent.; lateral stability, 10 per cent.; directional control, 15 per cent.; rising, 10 per cent.; landing, 10 per cent. The two last named awarded of course to r.o.g. models only. (*c*) Target contest, prizes £1 and 10*s*., awarded to the models landing nearest the bull's eye. (*d*) Looping the loop contest, prizes £2, £1 and 10*s*., awarded to the models which complete the greatest number of loops in any one flight. Referring to the details given *re* A and B, Mr. Tivy says: "The percentage of marks awarded for the qualities of design, stability, &c., varies with the relative importance of the qualities. For instance, excellence of design is better than excellence of workmanship, lateral stability is easier to obtain than longitudinal stability and directional control. In respect of each quality the judges will place the machine in one of six grades: A, B, C, D, E, F. The percentages are all divisible. The marking corresponding to the grades will begin in the case of design 0, 5, 10, 15, 20, 25, and in the case of lateral stability 0, 2, 4, 6, 8, 10. This system will reduce the labour of judging to a minimum, and I am confident that the net result of the sub-division of marks will be even more satisfactory than that adopted at our competition in June, 1912. I shall be pleased to forward copies to anyone interested in the competition, and I hope that some of the clubs which have not previously competed will now co-operate with us by sending one or more representatives to Bristol." We note from the programme that the models are to be flown in an enclosure 500 ft. long, and the length of flight should not exceed 150 yds. No marks will be awarded in respect of landings *outside* the enclosure. Competitors need not fly their own models. Representatives of two or more absent competitors will be given local assistance.

Taking the programme in its entirety, and omitting one or two minor points which one might be inclined to criticise, we must certainly congratulate the Bristol Model Aero Club both on the amount of prize money offered and on the regulations under which the meeting will be held, which put the absolutely useless factor of duration at a minimum, and lay maximum stress on some of the factors which are really useful.

Just one word with respect to D, looping the loop contest.

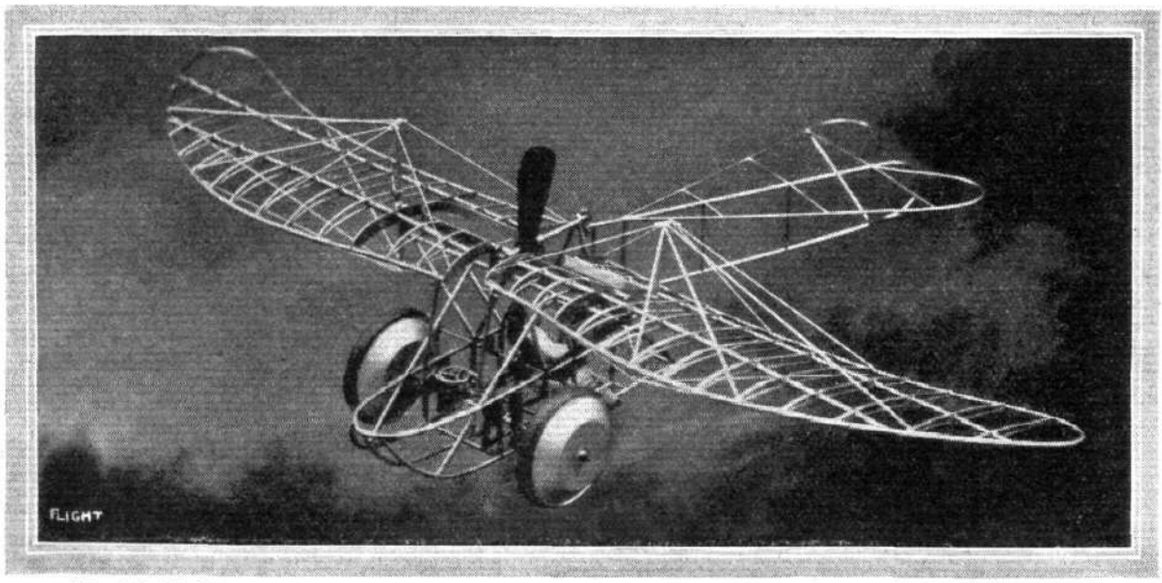
We think a mistake has been made in stating the prize will be awarded to the model making the most loops in any one flight. When such a contest was proposed by the writer (for the K. and M.A.A.) his idea was the value which such a contest might have with respect to the question of stability. The best model would be (in his opinion) a model (fitted with some automatic mechanical contrivance) which should rise from the ground, of its own accord, in a normal manner, and when up in the air make one complete loop, flatten out or fly normally, and then at the end of its flight glide normally to earth. The mere making of as many loops as possible appears to the writer to be a mere spectacular display and devoid of any scientific interest. We certainly think that other provincial model clubs would do well to follow the example of Bristol, and push themselves forward into any local exhibitions that may be held whenever possible. It is absolutely useless hiding your "flights" in some out-of-the-way field because it is large and offers the best facilities for sticking on 10 secs. more to your duration. People will never take any interest in something which they never see.



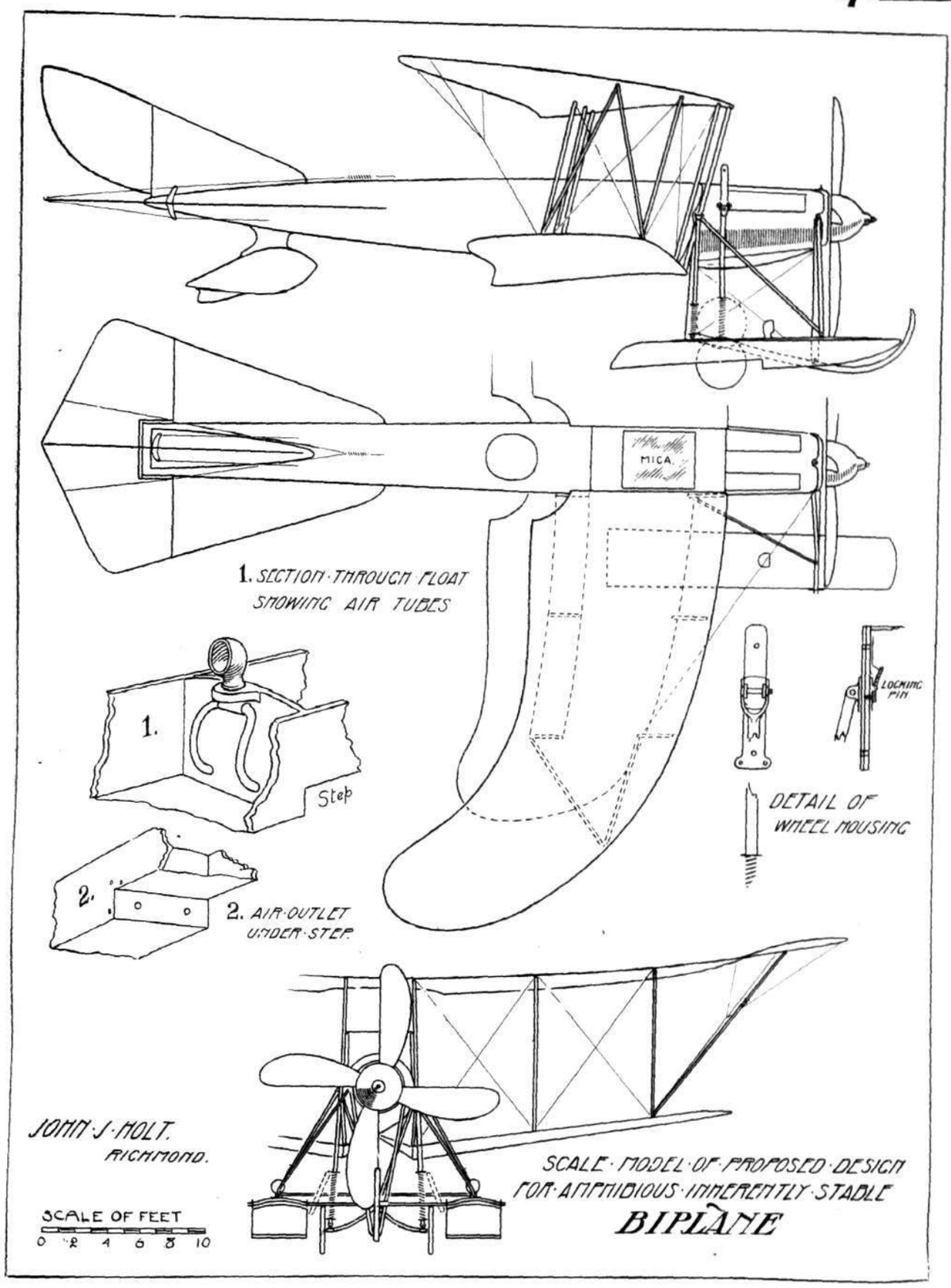
Mr. Holt's model water biplane.

Mr. J. J. Holt's Olympia Model.

We give this week some extremely interesting scale drawings kindly supplied us (as shown) by Mr. Holt of his Olympia model.



Mr. W. H. Nosworthy's prize-winning Olympia model, described in FLIGHT on May 2nd.



It is a type of model which we should like to have seen far more in evidence at the Show. To such a type of machine the term "model" can really be applied with some proper sense of proportion.

"The machine," says Mr. Holt, "was designed to incorporate fore and aft as well as lateral stability. It is an amphibious machine, the wheels when not required being raised on a slide, operated from the pilot's seat by a wheel. A locking pin fixes the head of the compression tubes either up or down. This, owing to illness, was not, unfortunately, completed at the time of the Show. The floats are single stepped, the steps being air fed by suitable ventilators as shown. The front supports are hinged to allow the telescopic tubes and compression springs of the rear sprung arrangement to act.

"The body of the machine is streamlined, and has a circular section in front, and would most suitably accommodate a radial engine. The scale is $\frac{3}{4}$ of an inch to the foot, and the model is rubber-driven, two skeins being used. The propeller is geared 2 to 1."

KITE AND MODEL AEROPLANE ASSOCIATION.

Official Notices.

British Model Records.

Single screw, hand-launched	Duration	D. Driver...	...	85 secs.
Twin screw, do.	Distance	R. Lucas ...	...	590 yards.
	Duration	G. Hayden	...	137 secs.
Single screw, rise off ground	Distance	W. E. Evans	...	290 yards.
	Duration	W. E. Evans	...	64 secs.
Twin screw, do.	Distance	L. H. Slatter	...	365 yards.
	Duration	J. E. Louch	...	2 mins. 49 secs.
Single-tractor screw, hand-launched	Distance	C. C. Dutton	...	266 yards
	Duration	J. E. Louch	...	91 secs.
Do., off-ground	Distance	C. C. Dutton	...	190 yards.
	Duration	J. E. Louch	...	94 secs.
Single screw hydro., off-water	Duration	L. H. Slatter	...	35 secs.
Single-tractor, do., do. ...	Duration	C. C. Dutton	...	29 secs.
Twin screw, do., do. ...	Duration	L. H. Slatter	...	60 secs.
Engine driven off grass ...	Duration	D. Stanger	...	51 secs.

Affiliation.—It is with pleasure that the Council announce the affiliation of La Ligue Française du Cerf-Volant. This league has twenty-seven kite associations affiliated to it, and it has become affiliated for the purpose of the proposed International Kite and Model Meeting.

French Competitions.—Messrs. L. Ingram and A. W. Howkins officially represented the Association at the kite meeting on May 30th, 31st, and June 1st at Boulogne. Although they did not compete they were thanked for the assistance they gave to several of the competitors (with the approval of the judges).

Kite Flying Competition.—Wimbledon Common, on Saturday, June 20th, at 3.30. Entries close June 17th. Open kite competition for prizes by Messrs. Brooke and Westhorp. Prizes: 1st, BrooKite, value 30s.; 2nd, BrooKite, value 95s.: third, BrooKite, value 15s. (the same as Mr. G. Marconi has been using for wireless telegraphy). Additional rules governing this competition: 1. Competitors may use any kind of kite, with minimum measurement of 20 ft. computed by Rule 2. 2. Competitors must be at the judges' flag at 3 p.m. sharp, any not then present will be disqualified. 3. Total length of line or wire to be 300 yards, but not exceed 310 yards. 4. Each competitor is allowed one assistant, who must wear the competitor's number. Any other person assisting will render the competitor liable to disqualification. 5. Marks will be awarded as follows: Angle, one mark for each degree attained, plus 3 extra for each degree above 50. Stability, 125; strength of construction, 75; portability, 50.

Model Competition.—Wanstead Flats, Leytonstone. Station, Forest Gate, G.E.Ry. Saturday, June 27th, at 3 o'clock. Entries close June 20th. Longest flight competition for models, rising off ground under their own power (open to the world). Prizes presented by Mr. A. W. Gamage: 1st, challenge cup and gold medal; 2nd, silver medal; 3rd, bronze medal. Additional rules governing this competition: 1. Competitors must be at the judges' flag at 3 p.m. sharp. Those not present at that time will be disqualified. 2. This competiton will be decided on the longest flight and not on the average.

Official Trials.—All entries for the official trials, to be held on Wimbledon Common on the 20th, must be sent in by Saturday, the 13th, to Mr. H. A. Lyche. Special forms can be had for trials from the gen. hon. secretary.

Programme.—The official programme is now published, and any members or readers who have not received a copy should send to the gen. hon. sec. at once for same, enclosing stamp for postage.

Badges.—The official badge for year 1914-15 is now ready, and all members will have one forwarded on receipt of their subscription. The wearing of the badge shows the judges that their subscription for current year has been paid. Those members who have only sent 5s. should forward the extra 1s. (as the subscription for year was raised at the general meeting), and their badge will then be forwarded.

27, Victory Road, Wimbledon. W. H. AKEHURST, Gen. Hon. Sec.

AFFILIATED MODEL CLUBS DIARY.

CLUB reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Leytonstone and District Aero Club (64, LEYSPRING ROAD).

JUNE 14TH, flying Wanstead Flats, 6.30 and 10.30 a.m. June 27th, afternoon, Gamage Cup competition. Route to Wanstead Flats will be published next week.

UNAFFILIATED CLUBS.

Finsbury Park and District (66, ELFORT ROAD, HIGHBURY, N.).

JUNE 13TH, flying at Finsbury Park, 3 p.m.; r.o.g. distance contest for tractor machines at 5 p.m.

S. Eastern Model Ae.C. (1, RAILWAY APPROACH, BROCKLEY).

FLYING meetings at week-end on Woolwich Common and Blackheath, at the usual times.

CORRESPONDENCE.

Brakes for Aeroplanes.

[1868] With reference to the recent letters on "Brakes for Aeroplanes" that have appeared in your paper, I should be pleased if you would publish the following.

I entirely agree with Messrs. Brook and Mair, that brakes would be of great value to aeroplanes, but I do not find it so easy to agree with their arrangement of applying brakes to the wheels of the landing chassis.

With this arrangement, it seems that one or two alternative disasters is likely to occur, dependent on the position of the wheels, relative to the centre of gravity of the machine.

(i) If the wheels of the landing chassis are not very far ahead of the c.g. of the machine, which is travelling at a considerable speed on alighting, it is highly probable that the aeroplane will make a sudden nose dive, on applying brakes to the wheels of the chassis, and disaster will follow.

(ii) If the wheels are very far forward, and so at a considerable distance from the c.g., the application of brakes to the wheels will have very much the same effect as in the case of the front wheel of a bicycle, and there is great possibility of severe shocks being sustained by the machine and its occupants.

Would it not be better if air brakes could be applied more nearly in a horizontal plane with the c.g., by suddenly turning surfaces into the vertical position, perpendicular to the direction of motion, and so exposing them to the full decelerating effect of the incident wind? In this way I think a very effective brake could be produced.

Would it not be advantageous also to arrange a drag which could be operated by a control?

During flight, it could be attached beneath the tail boom, and immediately on alighting could be released by the pilot, and a brake analogous to the rear brake of a bicycle thereby obtained.

HERMAN SHAW.

Royal College of Science, South Kensington.

Oscillating Wings.

[1869] Respecting my article on oscillating wings, one of your correspondents suggests that this phenomenon of increased reaction may explain the superiority of tractor screws. I am not clear whether experience shows a clear advantage with tractor screws over and above that due to the direct incidence of the slip stream, but would point out that it is by no means certain that the slip stream is subject to a periodic variation corresponding to the position of the propeller such as he suggests. If the projected area of the propeller is a sufficiently large fraction of the "disc area," the reaction is almost continuous, being carried on from blade to blade with little or no intermission, the gaps between the blades serving to allow adequate feed. It is true that some of the theories of propeller action have considered a spiral stream commencing from each blade, but I am of opinion that the stream becomes almost uniform throughout the whole circle at a distance behind the propeller which is quite a small part of the diameter. It is, however, a matter for experiment.

HERBERT CHATLEY.

Chinese Government Engineering College,
Tangshan, North China.
May 20th, 1914.

IMPORTS AND EXPORTS, 1913-1914.

AEROPLANES, airships, balloons, and parts thereof (not shown separately before 1910). For 1910 and 1911 figures, see FLIGHT, January 25th, 1912, and for 1912 and 1913, see FLIGHT for January 17th, 1914:—

	Imports.		Exports.		Re-Exportation.	
	1913.	1914.	1913.	1914.	1913.	1914.
	£	£	£	£	£	£
January	12,097	5,945	4,005	210	1,510	879
February	17,361	28,132	3,447	106	690	441
March ...	20,425	27,731	1,924	1,934	1,042	1,440
April ...	15,593	11,384	5,524	1,175	1,413	1,473
May ...	31,241	17,062	3,726	4,059	830	9,484
	116,717	90,254	18,626	7,484	5,485	13,717

Aeronautical Patents Published.

Applied for in 1913.

Published June 4th, 1914.

14,731. F. FILIASI. Longitudinal stability and landing device.
15,031. D. E. SHAW AND J. J. BROWNRIDGE. Control of aeroplanes.
16,367. L. CLÉMENT. Aeroplane wings.
16,732. S. B. W. H. VOSS. Flying machines.
19,681. M. E. YOUNG. Aerial machines.
20,479. A. SPRATER. Stabilizers.

Applied for in 1914.

Published June 4th, 1914.

6,764. A. CLEMENT-BAYARD. Frameworks for dirigible balloons.
7,987. F. R. PIO. Aeroplanes combined with parachutes.
8,594. A. CLEMENT-BAYARD. Car-suspensions for dirigible balloons.
8,758. W. H. NOSWORTHY AND S. J. PRESCOTT. Flying machines.

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